Population and Labour Force Projections for Alberta
1970–1985

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M. V. George, Ph.D.
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Human Resources Research Council

POPULATION AND LABOUR FORCE PROJECTIONS FOR ALBERTA

1970-1985

M. V. George, Ph.D.
and

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PREFACE

This is a study carried out for the Alberta Human Resources Research Council under Studies in Socio-Economic Opportunity during 1970-71. Dr. Karol J. Krotki, former Coordinator of the SEOS programme, HRRC, was mainly instrumental in our undertaking this study. We are indebted to Dr. Krotki for his critical assessment of our project proposal and the necessary arrangements he made for assigning the project to us. The generous cooperation, encouragement and assistance received from other officials of the HRRC, particularly of Dr. V. B. Proudfoot, Dr. James A. MacMillan, Mrs. Susan A. McDaniel, Mr. John Hudson and Mr. R. V. Neely in completing this project are also gratefully acknowledged.

The authors wish to express their appreciate and gratitude to Dr. A. Romaniuk, Chief, Population Estimates and Projections Section, Statistics Canada for providing us with the cohort fertility tables for Alberta and the relevant unpublished data used for the fertility projections for Canada which enables us to apply the cohort fertility method for projecting births in this study.

We are grateful to Statistics Canada for much of the basic data used in this report and the permission to carry out the study independently without any official involvement. The views or conclusions expressed in this report are those of the authors and should not be construed as expressing the opinion of the Alberta Human Resources Research Council or the organization with which the authors are associated.

Ottawa
March, 1972

M. V. George
K. S. Gnanasekaran

TABLE OF CONTENTS

Page

Introduction 1

Population Trends 4

Mortality Projections 8

3.1 Implications of Low Mortality, and General Appraisal of Data 8
3.2 Historical Trends in Mortality 10

3.21 Death Rate 10
3.22 Expectation of Life at Birth . . 13

3.3 Projected Mortality Trends 16
3.4 Characteristics of Mortality Projections 23

3.41 Infant Mortality Rate 27
3.42 Mortality in Ages 1 to 14 33
3.43 Adult Mortality Rates 35
3.44 Mortality at Old Ages 35
3.45 Causes of Deaths 36

3.5 Life Tables for Alberta 41

3.51 Abridged Life Tables 41
3.52 Survival Ratios by Single Years of Age 42

Fertility Projections: A Cohort Approach . . . 49

4.1 Introduction 49
4.2 The Cohort Versus Period Method 49
4.3 Fertility Trends Since 1921 (Period Approach) 53

4.31 The Influence of the Age Factor on Crude Birth Rate . . 54
4.32 Trends in Period Fertility Rates 57
4.33 The Influence of Marriage on Trends in Period Fertility Rates 62

4.4 Changes in the Distribution of Families by Number of Children Ever Born 65

Page

4.5 Fertility Differences Between Alberta and Canada 67
4.6 Cohort Approach to Current Fertility . . 72
    4.61 The Cohort Fertility Data 73
    4.62 Projection of Completed Cohort Fertility Rates 78
        4.621 Cohorts Born Between 1931 and 1943 80
        4.622 Cohorts Born Between 1943 and 1954 82
        4.623 Cohorts Born After 1954 87
        4.624 Conversion of Cohort Fertility Rates to Period Rates 93
4.7 Projections of Annual Births 98
4.8 Concluding Remarks 98

Migration Projections 102
5.1 Migration Data 102
5.2 Trends in Migration 106
5.3 Future Migration Trends 111
5.4 Age-Sex Composition of Migrants 115

Results of Population Projection 125
6.1 Projection Series and Selection 125
6.2 Total Population 127
6.3 Population Composition 129

Labour Force Projections 134
7.1 Data Sources 134
7.2 Size of Labour Force 135
7.3 Pattern of Labour Force Participation . . 138
7.4 Projections of Labour Force Participation Rates 141
    7.41 Male Participation Rates 141
    7.42 Female Participation Rates . . . 143
7.5 Indicated Changes 146
7.6 Concluding Remarks 154

Concluding Remarks 156

References 174

LIST OF CHARTS

Page

3.1 Standardized Death Rate for Canada and Alberta 1921-25 to 1966-69 11

3.2a Comparison of Age Patterns of Mortality by Sex for Alberta 1986 with 1966, and Model West MALES 25

3.2b Comparison of Age Patterns of Mortality by Sex for Alberta 1986 with 1966, and Model West FEMALES 26

3.3 Infant Mortality Rates for Alberta and Sweden 1946-1986 32

3.4 Cause-Specific Death Rates by Sex, Alberta, 1966 and 1986 39

4.1 Total Fertility Rates and Crude Birth Rates, Alberta, 1921-1969 59

4.2 Age Specific Fertility Rates, Canada and Alberta, 1937, 1959 and 1969 61

4.3 Period Total Fertility Rates and Completed Cohort Fertility Rates, Alberta 76

4.4 Actual and Projected Cohort Fertility Rates by Cohort, Alberta, 1900/01 to 1960/61 94

4.5 Actual and Projected Total Fertility Rates by Calendar Year for Alberta and Canada, per 1,000 Women, 1921-1985 94

5.1a Comparison of Different Age Patterns of Migrants, Alberta, 1961-1970: MALES 119

5.1b Comparison of Different Age Patterns of Migrants, Alberta, 1961-1970: FEMALES 120

6.1 Population of Alberta, 1970 and 1985 133

LIST OF TABLES

Page

2.1 Total Population and Annual Percentage Change in Population Over Preceding Year: Alberta and Canada, 1901-1970 5

3.1 Historical Trends in Death Rates for Canada, Alberta and other Prairie Provinces, 1921-25 to 1966-69 12

3.2 Gains in Expectation of Life at Birth by Sex, Canada and the Prairie Region/Alberta 1930-32 to 1965-67 14

3.3 Actual and Projected Gains in Expectation of Life at Birth for Canada and Selected Low Mortality Countries, 1960-2000 17

3.4 Projected Death Rates (per 1,000 population) by Age and Sex for Canada, 2000 A.D. 22

3.5a Actual and Projected Trends in Infant Mortality Rates for Alberta, Canada and Other Low Mortality Countries, Males, 1946-2000 28

3.5b Actual and Projected Trends in Infant Mortality Rates for Alberta, Canada and Other Low Mortality Countries, Females, 1946-2000 29

3.6 Rate of Decline in Infant Mortality Rate by Sex for Alberta, Canada and Other Low Mortality Countries, 1946-2000 31

3.7 Projected Trends in Age Specific Death Rates by Sex, Alberta, 1966 to 1986 34

3.8 Actual and Projected Death Rates by Cause and Sex, Alberta, 1966 and 1986 38

3.9 Projected Gains in Expectation of Life at Birth by Sex for Alberta through 1986 43

3.10a Life Table (1965-67) and Projected Survival Ratios by Single Years of Age for Males, Alberta, 1970, 1975, 1980, 1985 and 1986 . . . 45

Page

3.10b Life Table (1965-67) and Projected Survival Ratios by Single Years of Age for Females, Alberta, 1970, 1975, 1980, 1985 and 1986 . . . 47

4.1 Crude Birth Rates (births per 1,000 population), Alberta, 1921-1969 55

4.2 Percent Change in Age-Specific Fertility Rates and Total Fertility Rates, Alberta: 1921-1938; 1938-1959 and 1959-1969 58

4.3 Percentage of Women ever Married by Age, Alberta, 1921, 1931, 1941, 1961, 1966 and 1969 64

4.4 Separate Contribution of Nuptiality and Age-Specific Marital Fertility Rates to Changes in Total Fertility Rates, Alberta, 1931-1941, 1941-1961, 1961-1968 . . . 66

4.5 Percentage Distribution of Women ever Married Aged 45-54 Years by Number of Children ever Born, Alberta, 1941 and 1961 68

4.6 Fertility Level in Alberta and Canada as Measured by Various Indices 70

4.7 Ratios of Age-Specific Fertility Rates for Alberta to Those of Canada 71

4.8 Actual and Projected Completed Cohort Fertility Rates for Alberta and Canada, 1900-01 to 1969-70 83

4.9 Percentage Distribution of Completed Fertility Rate by Age for Selected Cohorts, 1921-22 and 1931-32, Alberta and Canada 91

4.10 Actual and Projected Total Fertility Rates by Calendar Year for Alberta and Canada, per 1,000 Women, 1921-1985 96

4.11 Percentage Distribution of Average Age-Specific Fertility Rates, 1967, 1968 and 1969, Alberta 97

4.12 Projected Age-Specific Fertility Rates, 1970, 1975, 1980 and 1985 for Alberta 99

Page

5.1 Growth of the Population of Alberta through Natural Increase and Net Migration, 1955-70 . . 107

5.2 Trends in Different Categories of Migration to and from Alberta during 1961-70 110

5.3 Ten Highest and Lowest Years of Migration during 1946-70 113

5.4 Assumed Average Annual Migration for Alberta during 1970-85 114

5.5 Average Age-Sex Composition of Migrants Based on Three, Five, Seven and Nine Years; Census Years 1961-62 to 1969-70, Alberta . . . 118

5.6 Assumed Age-Sex Composition of Migrants by Five Year Age Groups and Sex through 1985 . . . 122

5.7 Assumed Age-Sex Composition of Migrants by Single Years of Age and Sex through 1985 . . . 123

6.1 Fertility and Migration Assumptions underlying Projection Series A, Series B, Series C and Series D 127

6.2 Projected Population of Alberta, 1970-1985 . . . 128

6.3 Projected Age Composition of Population of Alberta, Both Sexes, 1970, 1975, 1980 and 1985 131

7.1 Trends in Population and Labour Force of Canada and Alberta, 1951, 1961 and 1970 136

7.2 Labour Force Participation Rates by Age and Sex, Canada and Alberta, 1961 and 1970 139

7.3 Trends in Labour Force Participation Rates by Age and Sex, Canada, 1961-70 142

7.4 Comparison of Projected Rates of Labour Force Participation by Age and Sex for Alberta with Those for Ontario, Canada and U.S.A. for 1980 144

Page

7.5 Projected Rates of Labour Force Participation by Age and Sex, Alberta, 1970 to 1985 147

7.6 Projected Changes in Total Labour Force of Alberta, 1970-1985 149

7.7 Labour Force Projections for Alberta by Age and Sex, 1970 to 1985. Series AL: Based on Population Projection Series A 150

7.8 Labour Force Projections for Alberta by Age and Sex, 1970 to 1985. Series BL: Based on Population Projection Series B 151

7.9 Labour Force Projections for Alberta by Age and Sex, 1970 to 1985. Series CL: Based on Population Projection Series C 152

7.10 Labour Force Projections for Alberta by Age and Sex, 1970 to 1985. Series DL: Based on Population Projection Series D 153

APPENDIX TABLES

Page

P.1 Projections of the Population of Alberta according to Various Assumptions of Mortality, Fertility and Migration, 1971, 1975, 1980 and 1985 161

P.2 Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES Series A: High Fertility and Net Migration Gain of 22,500 Persons a Year 162

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: MALES Series A: High Fertility and Net Migration Gain of 22,500 Persons a Year 163

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: FEMALES Series A: High Fertility and Net Migration Gain of 22,500 Persons a Year 164

P.3 Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES Series B: Medium Fertility and Net Migration Gain of 15,000 Persons a Year 165

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: MALES Series B: Medium Fertility and Net Migration Gain of 15,000 Persons a Year 166

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: FEMALES Series B: Medium Fertility and Net Migration Gain of 15,000 Persons a Year 167

P.4 Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES Series C: Low Fertility and Net Migration Gain of 7,500 Persons a Year 168

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: MALES Series C: Low Fertility and Net Migration Gain of 7,500 Persons a Year 169

Page

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: FEMALES Series C: Low Fertility and Net Migration Gain of 7,500 Persons a Year 170

P.5 Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES Series D: Low Fertility and Zero Migration a Year 171

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: MALES Series D: Low Fertility and Zero Migration a Year 172

Projections of the Population of Alberta by Age and Sex, 1970 to 1985: FEMALES Series D: Low Fertility and Zero Migration a Year 173

D.1 Abridged Life Table by Sex for Alberta, 1960-62 . . . . 173a

INTRODUCTION

This study presents the population and labour force projections for Alberta by age and sex for each year from 1970 to 1985. The study was carried out in two stages. First, population projections by age and sex for the province, 1970 to 1985 were prepared. Secondly, based on the population projections, a series of labour force projections by age and sex through 1985 were produced.

Unlike the existing population projections for Alberta (Oil and Gas Conservation Board, 1968; Alberta Bureau of Statistics, 1968), the present projections take into account demographic changes in recent years and use the post-censal population estimates for 1970 by age and sex as the bench-mark data for projections. Important demographic changes have occurred in the 1960's which have far-reaching implications for the future. The steady fall in birth rate with its effect on growth rate, the swelling of the reproductive and labour force age groups as a consequence of the post-war "baby boom", and the rapidly growing proportions of women entering the labour force have major implications on the future size and structure of total population and labour force. Furthermore, the labour force projections at the provincial level, like the population projections, are seriously affected by the recent trends in internal and international migration. This study attempts to take into account the likely effects of these demographic changes on the future population and labour force.

Because of the uncertainties about the future behaviour of the basic components of population change and their determinants, the projections are made under certain assumptions on the likely trends in births, deaths, migration and labour force participation rates over the next fifteen years. The projections presented here, therefore, should be taken not as predictions, but as approximations to the probable size and composition of future population and labour force under given assumptions. Four series of population projections and three series of labour force projections are presented to give the users some latitude of choice. Implicit in these projections is the general assumption that there will be no catastrophic events which will seriously affect the components of population change over the entire period of projection.

A component method of projection, involving separate projections of fertility rates, mortality rates, immigration and emigration, is employed to prepare the population projections. These projections are made by single years of age and sex for each year as of June 1. The labour force projections by broad age groups and sex are derived from the population projections by applying the projected participation rates by age and sex. Methodologically, these series depart from the previous projections in adopting the cohort fertility method for projecting births, and in developing the mortality projections based on cause of death analysis.

Chapter II deals with a brief review of population change in Alberta. Chapters III to V contain a brief analysis of the data, description of the methodology used to project the basic components of population change and labour force, a discussion of the assumptions, and detailed statistical tables giving the results. As much as possible the methodology used is consistent with the current and emerging demographic techniques and data available for Alberta. Chapter VI gives the main results of population projections and their implications. On the basis of population projections presented in Chapter VI, labour force projections are prepared in Chapter VII. The projections are prepared after an intensive analysis of the various components of population change which makes it possible to have a broader perspective of the mechanism by which population and labour force change than would be possible if attention were confined to the methodological and technical aspects of projections. Chapter VIII is devoted to a few concluding remarks on the projection results.

POPULATION TRENDS

The object of this chapter is to describe briefly the basic features of population growth in Alberta and to indicate the relative contribution of the components of population change.

From a small population of 73,000 in 1901, the population of Alberta increased to 1,599,000 in 1970. Its population growth rate is one of the highest among Canadian provinces with a current growth rate of about 2.4 percent per annum. Table 2.1 presents a summary of Alberta's population growth in relation to Canada from the beginning of the present century. The establishment of the wheat economy in the early part of this century induced a significant inflow of population to the province both from abroad and from eastern Canada. The growth rate of 412.6 percent recorded during 1901-1911 was the second highest growth rate among the provinces, exceeded only by Saskatchewan. Part of this phenomenal growth rate during this period may be attributed to the small population size in 1901. By 1921 the population size reached 588,000 with an increase in the province's share of Canada's population from 1.4 percent in 1901 to 6.7 percent in 1921. During 1911-21 and 1921-31 Alberta's growth rate was the highest among the provinces, surpassed only by British Columbia during the latter decade. Being almost totally dependent

TABLE 2.1 -- Total Population and Annual Percentage Change in Population Over Preceding Year: Alberta and Canada, 1901-1970

Year (1)	Alberta		Canada		$\frac{\text{Col. (2)}}{\text{Col. (4)}} \times 100$ (6)
	Population (2)	Average annual growth rate % (3)	Population (4)	Average annual growth rate % (5)	
1901	73,022	-	5,371,315	-	1.36
1911	374,295	41.26	7,206,643	3.42	5.19
1921	588,454	5.72	8,787,949	2.19	6.70
1931	731,605	2.43	10,376,786	1.81	7.05
1941	796,169	0.88	11,506,655	1.09	6.92
1951	939,501	1.80	14,009,429	2.18	6.71
1956	1,123,116	3.90	16,080,791	2.96	6.98
1961	1,331,944	3.72	18,238,247	2.68	7.30
1966	1,463,203	1.98	20,014,880	1.94	7.31
1970	1,598,700	2.32	21,377,000	1.70	7.48

SOURCE: DBS, Census of Canada, 1961, Bulletin 7.1-1, *General Review*, Table 1; DBS, Census of Canada, 1966, Bulletin S-401, *General Population Trends*; and Population Estimates prepared by DBS for 1970.

on agriculture, the depression of the thirties brought an end to the phenomenal upsurge of population in Alberta with a growth rate of only 8.8 percent during 1931-41.

Significant population growth resumed in Alberta in the late forties and in the fifties with the highest growth rate of 41.8 percent in 1951-61 among the provinces. The fast rate of growth of population in the fifties may be attributed primarily to the growth of the petroleum industry which augmented and stabilized the economy. The growth rate slackened again after 1961 with the lowest growth rate of 0.91 percent during 1965-66 (Table 5.1). Since 1966 there is a steady increase in the growth rate. In 1970 Alberta's population constituted 7.5 percent of the total population of Canada.

An explanation for the variation in population growth, both in absolute and relative terms, has to be sought broadly in factors of (a) natural increase (i.e., births minus deaths) and (b) net migration (the balance of in-migration plus immigration and out-migration plus emigration). The data given in Table 5.1 for the past 15 years reveal the relative contribution of migration and natural increase on the total population change. Although natural increase has been the predominant factor of population growth, migration is the main contributory factor for the great fluctuations in Alberta's growth rate. For example, while the annual natural increase during 1955-70 varied between 13,200 and 43,000, the corresponding variation in net migration was between -8,300 and

15,900. It should be noted that when there was a net loss due to migration, natural increase was the sole source of population growth. After a net loss of population due to migration during 1963-66, there was a steady increase in the contribution of migration both in absolute and percentage terms. In 1969-70, migration contributed about 43 percent of the total population growth. The decline in natural increase since 1960 can be attributed to the stable trend in death rate and the steady decline in birth rate.

The trends and patterns of each component of population growth and their prospects for future population growth in Alberta are discussed in the subsequent chapters.

MORTALITY PROJECTIONS

3.1 Implications of Low Mortality, and General Appraisal of Data

The role of mortality in population projections is not as crucial as the other two components, fertility and migration. This is because at the prevailing very low level of mortality in Alberta and Canada as well as in other industrialized societies, its influence on overall population growth and structure is relatively small. The great reduction leading to the present low levels of mortality has been due to economic advances and general rise in the standard of living of people. It is also in large measure the result of modern achievements of medical science and the organization of basic health services and medical insurance schemes to all segments of population.

The transition from a high to a low level of mortality witnessed great reductions in death rates at ages between early childhood and middle age with the control of infectious, parasitic and respiratory diseases. Mortality rates at the old ages have shown relatively small decreases owing to the intractibility of cancer and cardiovascular diseases that predominantly affect this group. Under these circumstances, the scope for further decline of mortality may rest chiefly on new medical discoveries that will lead to the postponement of deaths in old ages, and significant reduction of deaths due to traffic accidents which have recently increased considerably in the advanced countries.

Against this general overview of mortality situation today, the trends and levels of mortality in Alberta are examined in detail and compared with changes observed in Canada and/or other low mortality countries with a view to projecting the future mortality. It should be pointed out that mortality is investigated here primarily from the demographic rather than the medical point of view. Projections based on a comparison of mortality in Alberta with relatively lower mortality areas may sometimes be considered to take indirectly into account new advances in medicine and their effects on mortality. Nevertheless, it must be noted that no attempt is specifically made here to survey the developments in the medical and health fields and research in progress that may have an impact on the future mortality, especially at the old ages.

Death registration in Alberta, which began in 1920, is fairly complete with more than 95% coverage of events (Brower et al., 1956, p. 98). The registration system is very comprehensive, and the person responsible for the disposal of the body is required to complete the personal details and to arrange for certification of the medical particulars, including the cause of death, by attending physician or coroner. The procedure may ensure a greater degree of accuracy, particularly of the information regarding cause of death.

The data for calendar year are published in the DBS annual publication of Vital Statistics. The published tabulations along with census data are found to be generally adequate except perhaps for separate life tables for Alberta for the years before 1966. The available life tables before 1966 relate to the Prairie region consisting of Alberta, Manitoba and Saskatchewan. For the first time an official life table for Alberta was published for the census year 1966 (1965-67). For purposes of present analyses, an additional life table for Alberta is constructed in this study for the census year 1961 (i.e. 1960-62).[1]

3.2 Historical Trends in Mortality

3.21 Death Rate

The crude death rate in Alberta was about six to seven per thousand population in the sixties. The rate was consistently below the recorded rate for Canada over the past several decades (Chart 3.1). The crude rate, however, is not a good measure for comparison as it does not take into account differences in the age-sex composition of the two populations, i.e. of Canada and Alberta. Age-sex adjusted (or standardized) death rates are, therefore, presented in Table 3.1.

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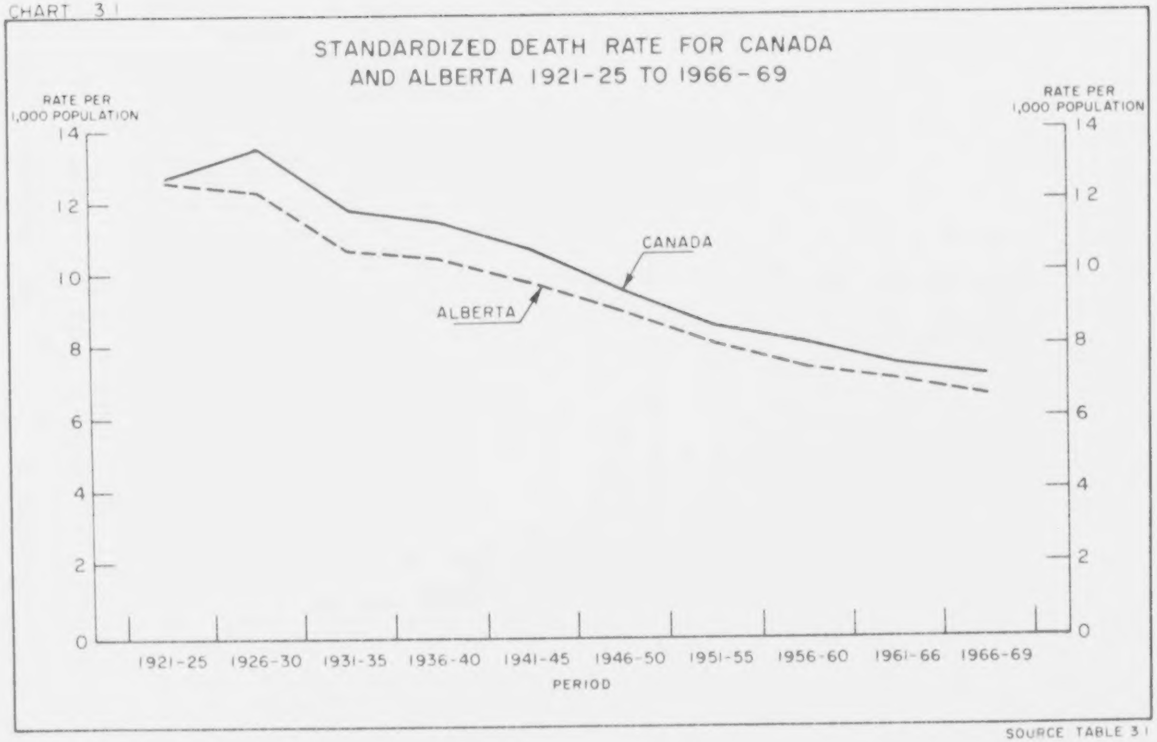
[1] The Greville method of computing abridged life table was used. For its application to Canadian data, see Silins and Zayachowski, 1966.

CHART 3.1



STANDARDIZED DEATH RATE FOR CANADA AND ALBERTA 1921-25 TO 1966-69

SOURCE TABLE 3.1

TABLE 3.1 -- Historical Trends in Death Rates for Canada, Alberta and other Prairie Provinces, 1921-25 to 1966-69

Period	Crude death rate		Standardized death rate[a]			
	Canada	Alberta	Canada	Alberta	Manitoba	Saskatchewan
	(Rate Per 1000 Population)					
1921-25	11.3	8.3	12.7	12.6	12.1	10.9
1926-30	11.2	8.4	13.5	12.3	11.8	10.9
1931-35	9.9	7.3	11.8	10.6	10.3	9.8
1936-40	9.9	7.7	11.4	10.4	10.6	9.7
1941-45	9.9	8.0	10.7	9.8	10.2	9.2
1946-50	9.3	8.0	9.5	8.9	9.0	8.4
1951-55	8.5	7.4	8.6	8.1	7.9	7.5
1956-60	8.0	6.9	8.1	7.4	7.5	6.9
1961-65	7.7	6.7	7.5	7.0	7.0	6.6
1966-69[b]	7.4	6.5	7.2	6.6	6.7	6.4

[a] The rates are standardized on the basis of 1956 census population of Canada by age and sex.

[b] The average for standardized death relates to the period 1966-68.

SOURCES: DBS, Vital Statistics, 1968, Table D6 and 1969 (Preliminary Report), Table 15.

Assuming that a death rate of ten per thousand marks the threshold of low mortality, it is remarkable that Alberta had attained this level much earlier than Canada and many low mortality areas of today. The unadjusted average death rate for low mortality countries of Europe, namely, Denmark, England and Wales, Netherlands, Norway and Sweden was 10.3 per thousand in 1945-48 and 9.3 per thousand in 1955-58 (United Nations, 1963, p. 19). This comparison is, however, less valid as the rates for these countries are affected by different age-sex structures of their populations. Hence, the trend in expectation of life at birth, which is accepted as a superior measure of mortality for comparison, is examined below.

3.22 Expectation of Life at Birth

The low mortality level in the province of Alberta as compared with the country as a whole is also borne out by the calculations of expectation of life at birth (E_0 values) or the average number of years a newborn infant is expected to live as shown in Table 3.2. The values for the period before 1960-62 relate to the Prairie Provinces as a whole covering Manitoba, Saskatchewan and Alberta. Like Alberta, the other two provinces have had lower mortality than Canada as shown in Table 3.1, and there were not much differentials in mortality among the three provinces. Therefore, the official values of expectation of life at birth calculated for the Prairie region may be taken to

TABLE 3.2 -- Gains in Expectation of Life at Birth by Sex,
Canada and the Prairie Region/Alberta
1930-32 to 1965-67

Period and Sex	Prairie Region		Canada	
	Expectation of life at birth (years)	Annual gain since preceding period	Expectation of life at birth (years)	Annual gain since preceding period
Males				
1930-32	63.47	..	60.00	..
1940-42	65.43	0.39	62.96	0.59
1950-52	68.36	0.59	66.33	0.67
1955-57	69.26	0.18	67.61	0.26
1960-62	69.79	0.11	68.35	0.15
	69.48[a]			
1965-67	70.10[a]	0.12[a]	68.75	0.08
Females				
1930-32	65.49	..	62.10	..
1940-42	68.19	0.54	66.30	0.84
1950-52	72.28	0.82	70.83	0.91
1955-57	74.18	0.38	72.92	0.42
1960-62	75.66	0.30	74.17	0.25
	75.47[a]			
1965-67	76.24[a]	0.15[a]	75.18	0.20

[a] Figures are for Alberta. The values for 1960-62 are calculated in this study. See Appendix Table D.1.

SOURCES: DBS, Life Expectancy Trends 1930-32 to 1960-62, 84-518, Table 9 and DBS, Life Tables, Canada and Provinces 1965-67, 84-527, pp. 12, 14, 48 and 50.

reflect by and large the actual mortality trends in Alberta for the earlier decades.[2]

Based on these values, it is clear that the Prairie Provinces have enjoyed a higher life expectancy than Canada for a long period. In the sixties, the expectation of life at birth of about 70 years for males and over 75 years for females in Alberta came close to the level obtained in countries like Sweden, Norway and the Netherlands which are the world leaders in low mortality with the highest expectation of life at birth.

The life expectancy has been increasing steadily over the past for males as well as females. Between 1940-42 and 1950-52, the increase was about the greatest for Alberta, showing an annual gain of 0.59 years for males and 0.82 years for females. The gain had subsequently been less for both sexes as the level increased continuously (see Table 3.2). In the most recent period, 1950-52 to 1965-67, the expectation of life at birth increased from 68.36 to 70.10 years for males and 72.28 to 76.24 years for females. In absolute terms, this increase represents a gain of 1.74 years among men and 3.96 years among women over a span of fifteen years.

At this point, two points may be underlined from the unforeseen trends in expectations of life at birth for the sexes. Firstly, contrary to a general expectation among demographers, the differential in life expectancy between males and females had further widened in the past as mortality continued to drop to lower levels. Thus, the values of life expectancy for the two sexes differed by 2.02 years in 1930-32 and 6.14 years in 1965-67. Secondly, the rate of gain in expectation of life at birth has been falling rather persistently since 1950-52. Future gains are, therefore, expected to be less than the rates of increase in the previous years.

---

[2] The E_0 values for the region may be inferred to be slightly higher than that for Alberta on the basis comparison of the expectation of life at birth for Alberta only with that of the region for the period 1960-62 (see Table 3.2).

For Canada, the expectation of life at birth was 68.35 years for males in 1960-62 or about the same level which Alberta had attained some ten years earlier. The situation was far better for females, with a lag of only five years. In contrast, the European countries of low mortality, notably Sweden, Norway and the Netherlands, had achieved the present level of expectation of life at birth of about 70 years for males as early as in the 1950's or some fifteen years earlier than Alberta. At the same time, it is striking to note from Tables 3.2 and 3.3 that the trend of life expectancy for females of Alberta had kept pace and compared very favourably with the improvements in these countries.

3.3 Projected Mortality Trends

From the point of mortality projections, two

TABLE 3.3 -- Actual and Projected Gains in Expectation of Life at Birth for Canada and Selected Low Mortality Countries, 1960-2000

Period/Year	Males		Females	
	Expectation of life at birth (years)	Annual gain since preceding date	Expectation of life at birth (years)	Annual gain since preceding date
			Canada	
Study I[a]				
1965-67	68.75	..	75.18	..
1984	70.39	0.07	76.31	0.06
Study II[b]				
1965-67	68.75	..	75.18	..
2000				
High	69.77	0.03	76.66	0.04
Medium	71.94	0.09	78.57	0.10
Low	74.03	0.16	79.04	0.11
			Sweden	
1946-50	69.04	..	71.58	..
1951-55	70.49	0.29	73.43	0.37
1956-60	71.24	0.15	74.92	0.30
1961-65	71.60	0.07	75.70	0.16
1967	71.85	0.06	76.54	0.17
1970	72.10	0.08	76.90	0.12
1980	72.50	0.04	78.00	0.11
			Norway	
1946-50	69.25	..	72.65	..
1951-55	71.11	0.37	74.70	0.41
1956-60	71.32	0.04	75.57	0.17
1961-65	71.03	0.16	75.97	0.08
			Netherlands	
1947-49	69.40	..	71.50	..
1950-52	70.60	0.40	72.90	0.47
1953-55	71.00	0.13	74.70	0.60
1956-60	71.40	0.10	74.80	0.25
1966	71.10	0.04	76.10	0.16
			Switzerland	
1958-63	68.70	..	74.10	..
1970	70.00	0.13	75.80	0.17
1975	71.00	0.20	76.50	0.14
1980	71.80	0.16	77.30	0.16
1985	72.50	0.14	78.00	0.14
2000	74.50	0.13	80.30	0.15

[a] In this study by W. Zayachkowski, the survival ratios by age and sex were projected on the basis of past trends. The values of $\overset{\circ}{e}_{0}$ are calculated here for the purpose of comparison (unpublished study).

[b] The projections in this study by M. V. George are based on analyses of causes of death statistics for Canada. The $\overset{\circ}{e}_{0}$ value for medium projections is calculated here.

SOURCES: W. Zayachkowski, Mortality Projections for Canada up to 1984, Background Paper prepared for DBS 1969. Population Projections, Health and Welfare Division, DBS, November 1969 (unpublished); M. V. George, Projections of Mortality to 2000 by Causes of Death in Canada, Census Division, DBS, July 1969 (unpublished); United Nations, Demographic Year Book, 1951, 1957, 1967 and 1968; and unpublished data.

questions often arise: (i) whether and to what extent the steady mortality decline noticed over the past in Section 3.2 will continue into the future? and (ii) whether the long-observed pattern of higher expectation of life among women will persist, even more pronouncedly, by responding very favourably to future medical progress to postpone deaths or whether the present gap will narrow down over the coming years? No definite answers to these questions can be found in the demographic literature. Nevertheless, on the basis of historical trends in Alberta and experiences of the leading countries in the mortality field, the following assumptions (though not answers) are made in respect of the future trend in the province.

Table 3.3 shows that Sweden had an expectation of life at birth of 72.1 years for males in 1970. Similarly, Norway and the Netherlands had higher life expectancy than Alberta for males, with 71.03 years in 1961-65 for Norway and 71.10 years in 1966 for the Netherlands. In the light of these achieved levels, it is assumed here that the present expectation of life at birth of 70.10 years for Alberta has potentialities to increase over the coming years. Assuming the same rate of gain of 0.12 years per annum that was observed for the recent period 1960-62 to 1965-67, the expectation of life at birth for males may be projected to go up by 2.40 years in the next twenty years or to 72.50 years by 1986. But, judging by historical trends for Alberta as well as other areas, it is not likely to increase at the past rate and, therefore, it is assumed here that the expectation of life at birth would not be higher than 72.50 years for males in 1986.

For females, the expectation of life at birth was 76.9 years in Sweden in 1970. This is projected to go up to 78.0 years by 1980 (see Table 3.3). Switzerland anticipates a life expectancy of 78.0 years for females by 1985 and 80.3 years by 2000. As Table 3.3 shows, the rise in expectation of life at birth for females had in all countries taken place commensurate with the increase in male expectation of life. Furthermore, the rate of gain for females had often been greater than that observed for males. In the light of these, it is assumed that the mortality differentials by sex for Alberta will continue and even increase in future. Supposing, as in the case of males, the same rate of gain of 0.15 year per annum that was noted for the recent period 1960-62 to 1965-67, the expectation of life at birth for females may be anticipated to increase by 3.00 years in a span of twenty years from 1966 or reach the level of 79.24 years by 1986. However, as for males, because the rate of gain in the expectation of life for females has been falling steadily, it is assumed that the upper level of expectation of life at birth will be 79.24 years in 1986.

The above projected levels of expectation of life at birth are not enough for making population projections. The next steps are: (a) the projections of schedules (or patterns) of age specific mortality rates by sex that correspond closely to the projected values of life expectancy; and (b) the constructions of life tables involving the projected mortality schedules to arrive at the survival ratios by age and sex for the projections years. A number of approaches are possible for projecting the mortality schedules. One direct approach is to project the schedules of age specific death rates for Alberta on the basis of observed trends in the past. Another, but indirect approach is to select a few schedules (or patterns) usually from the existing mortality projections that have been made on a more sophisticated basis than what is feasible under the direct approach and to examine them in detail for application to Alberta. The latter approach is followed here, using the available mortality projections for Canada.

Two sets of mortality projections by age and sex are available for Canada. The first set of projections through 1984 are those used in the preparation of official population projections for Canada (DBS, 1970). They are based on the past trends in the survival ratios by age and sex (Zayachkowski, 1969). The second set of projections up to 2000 are prepared on the basis of a component method that investigates past trends and takes into account the separate effects of likely changes in each major cause of death on the future mortality level and pattern (George, 1969). In view of the greater sophistication of the latter approach, the second set of mortality projections are preferred in this study. This set of projections by cause of death contains three variants--high, medium and low. Both the high and the low are independent projections, while the medium is merely an average of the two. The projected mortality schedules for Canada and the resulting levels of expectation of life at birth for males and females are shown in Table 3.4.

The life expectancy according to the medium projections presented in Table 3.4 is 71.94 years for males. It is earlier postulated for Alberta, as upper limit, an expectation of life at birth of 72.40 years for males by 1986. The level of 69.77 years according to the high projections for Canada has been already reached by Alberta before 1965-67 and hence, the medium mortality schedule is considered most suited for Alberta. It implies an annual rate of gain of 0.09 years during 1966 to 1986 which is considered feasible in the light of past trends in Alberta as indicated by Table 3.2. Also, the experiences of countries that are ahead of Alberta in this respect demonstrate that the implied annual rate of increase for men is not beyond one's reach. For example, in Sweden the increase in expectation of life from the level of 70.49 years in 1953 (i.e. 1951-55) to 72.10 years in 1970 took place at the rate of 0.10 year per annum among males.

For females, the expectation of life under the medium mortality schedule in Table 3.4 is 78.57 years in

TABLE 3.4 -- Projected Death Rates (per 1000 population) by Age and Sex for Canada, 2000 A.D. (Figures in the brackets denote the expectation of life at birth in years)

Age group and sex	High	Medium		Low	Model West	
	1000 m_x	1000 m_x	1000 q_x	1000 m_x	1000 m_x (Level 24)	1000 m_x (Level 23)
Males	(69.77)	(71.94)		(74.03)	(73.90)	(71.19)
0	15.97	13.22	12.98	10.47	13.49	21.86
1-4	0.92	0.80	3.21	0.68	0.40	0.86
5-9	0.54	0.48	2.38	0.41	0.26	0.45
10-14	0.44	0.40	1.98	0.35	0.23	0.38
15-19	1.18	1.06	5.31	0.95	0.47	0.74
20-24	1.77	1.58	7.89	1.40	0.65	1.03
25-29	1.47	1.33	6.64	1.19	0.62	1.02
30-34	1.49	1.35	6.72	1.21	0.70	1.14
35-39	2.00	1.69	8.41	1.38	0.94	1.51
40-44	3.30	2.73	13.55	2.16	1.55	2.33
45-49	5.35	4.35	21.53	3.36	2.90	4.02
50-54	9.19	7.45	36.56	5.71	5.19	6.78
55-59	14.62	11.80	57.32	8.98	9.45	11.62
60-64	23.64	19.37	92.40	15.11	15.80	18.84
65-69	34.63	28.74	134.06	22.85	26.64	30.72
70-74	53.35	45.88	205.82	38.41	44.83	50.33
75-79	81.46	71.28	301.81	61.09	74.31	81.74
80-84	122.95	112.50	435.42	102.05		
85-89	183.28	159.45[a]	558.21	159.45	162.38	172.00
90+	290.54	252.77[a]	1000.00	252.77		
Females	(76.66)	(78.57)		(79.04)	(77.50)	(75.00)
0	12.46	10.52	10.39	8.58	9.01	15.37
1-4	0.74	0.66	2.62	0.56	0.25	0.60
5-9	0.34	0.30	1.48	0.26	0.12	0.25
10-14	0.26	0.23	1.14	0.19	0.10	0.21
15-19	0.46	0.40	2.02	0.35	0.18	0.35
20-24	0.47	0.42	2.09	0.36	0.27	0.51
25-29	0.51	0.44	2.22	0.38	0.35	0.64
30-34	0.71	0.61	3.02	0.50	0.47	0.83
35-39	1.05	0.88	4.39	0.70	0.70	1.17
40-44	1.65	1.36	6.76	1.06	1.16	1.78
45-49	2.72	2.21	10.99	1.70	2.10	2.94
50-54	4.29	3.48	17.24	2.66	3.43	4.61
55-59	6.58	5.31	26.19	4.03	5.69	7.33
60-64	10.79	9.06	44.31	7.32	9.53	12.00
65-69	17.29	14.54	70.21	11.79	17.70	21.22
70-74	29.10	25.58	120.45	22.06	32.66	37.80
75-79	51.14	45.59	205.05	40.03	59.80	66.80
80-84	87.16	80.06	333.44	72.95		
85-89	143.14	133.14	492.36	123.14	145.37	153.97
90+	239.28	222.56	1000.00	205.84		

[a] Rates are the same as under the low assumptions.

SOURCES: M. V. George, "Projections of Mortality to 2000 by Causes of Death in Canada", Census Division, DBS (Ottawa, July 1969), Tables 5a, 5b and 6b (unpublished); A. J. Coale and P. Demeny, Regional Model Life Tables and Stable Populations, 1966, pp. 24-25.

1986 or a rate of increase of 0.12 years per annum from 1966. On the basis of mortality trends in Alberta, it is assumed earlier that life expectancy will rise from 76.24 years in 1966 (i.e. 1965-67) to 79.24 years by 1986. The high mortality schedule represents a level of 76.66 years for females which would mean an annual rate of gain (0.02 year) far less than 0.09 a year assumed previously for males. In the past the female rate of gain had been greater than male, and hence, the medium mortality schedule is adopted for females as well.

3.4 Characteristics of Mortality Projections

The foregoing selection of medium mortality schedule for Alberta projection is made solely on the basis of the projected level in expectation of life at birth for each sex. It is, however, very important to examine these mortality schedules shown in Table 3.4 for males and females for their consistency with the patterns observed for Alberta before finally adopting them. This appraisal can be carried out in respect of various characteristics of projected mortality changes. For the purpose here, the implied levels and rates of future decline are mainly examined by age and sex, and to a lesser extent, by major causes of death.

The age curve (or schedule) of mortality, irrespective of its level, conforms to a "standard" pattern in every part of the world (United Nations, 1963, p. 51).

Normally, the death rate starts at a high peak among the infants, diminishes to a minimum in the early teens, and then rises gradually at first and more and more rapidly as age advances, until the last survivors of the generation are extinguished. Chart 3.2 presents the age specific death rates (i.e. annual number of deaths per 1,000 mid-year population by age) by sex for Alberta for the years 1966 and 1986. Comparison of the assumed age curve of mortality by sex for 1986 shows a general conformity with the patterns observed in the past for Alberta and with the "standard" pattern described above.

The mortality patterns underlying "West" model life tables that were developed by Coale and Demeny[3] are also shown in Chart 3.2. These mortality curves imply an expectation of life at birth of 71.19 years (Level 23) and 73.90 years (Level 24) for males. The female mortality curve represents a life expectancy of 77.50 years (Level 24), which is the highest value given in their study (Coale and Demeny, 1966, p. 25). A comparison of these patterns convinces that overall medium mortality schedules presented in Table 3.4, especially the underlying levels by age for males and females, conform closely to the patterns based on the experiences of many populations. Nevertheless, in

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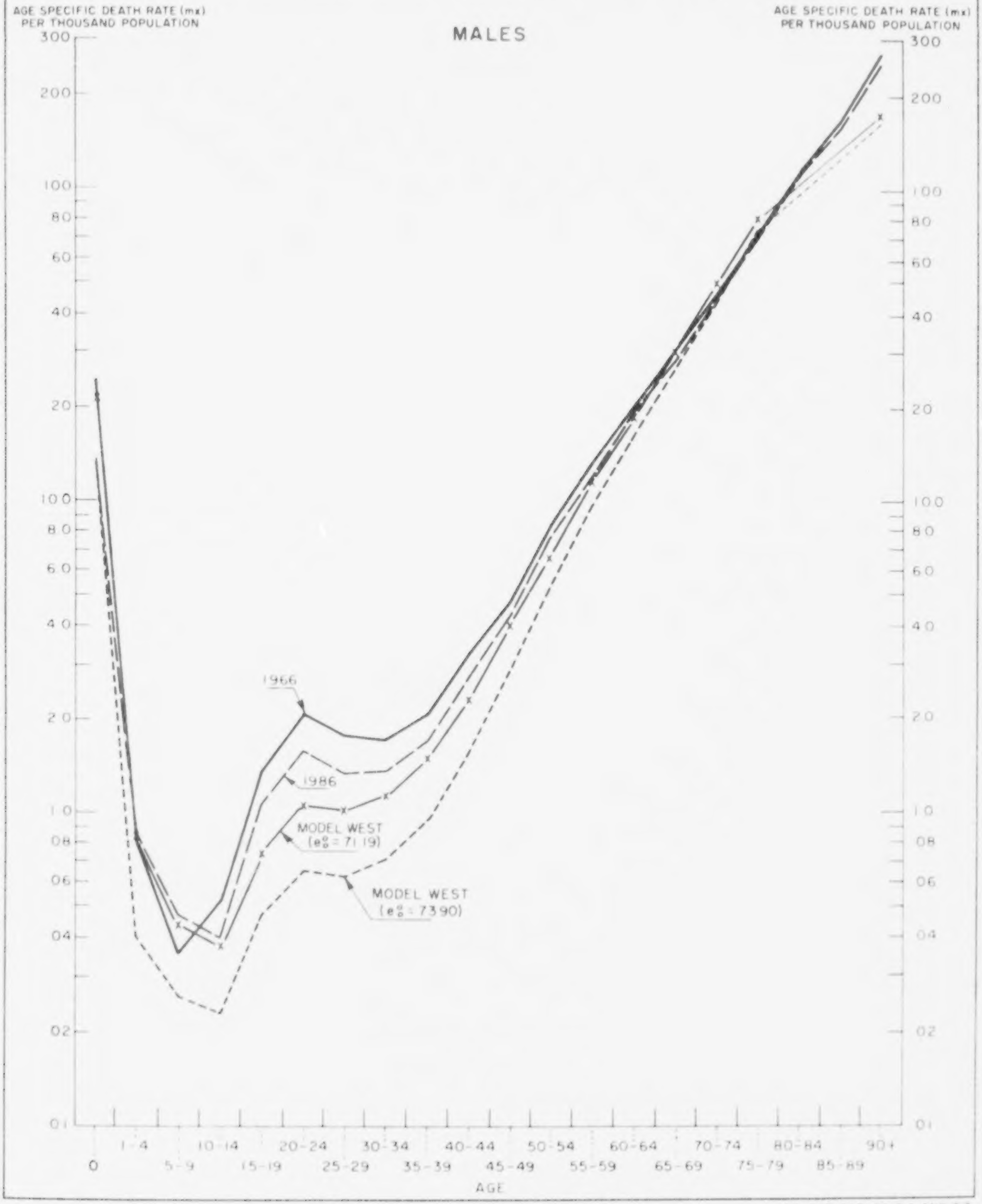
[3] The "West" model life tables were based on mortality experience recorded in populations known to have relatively good vital statistics and included almost all low mortality countries of today. See Coale and Demeny, 1966, p. 14.

CHART 3.2a

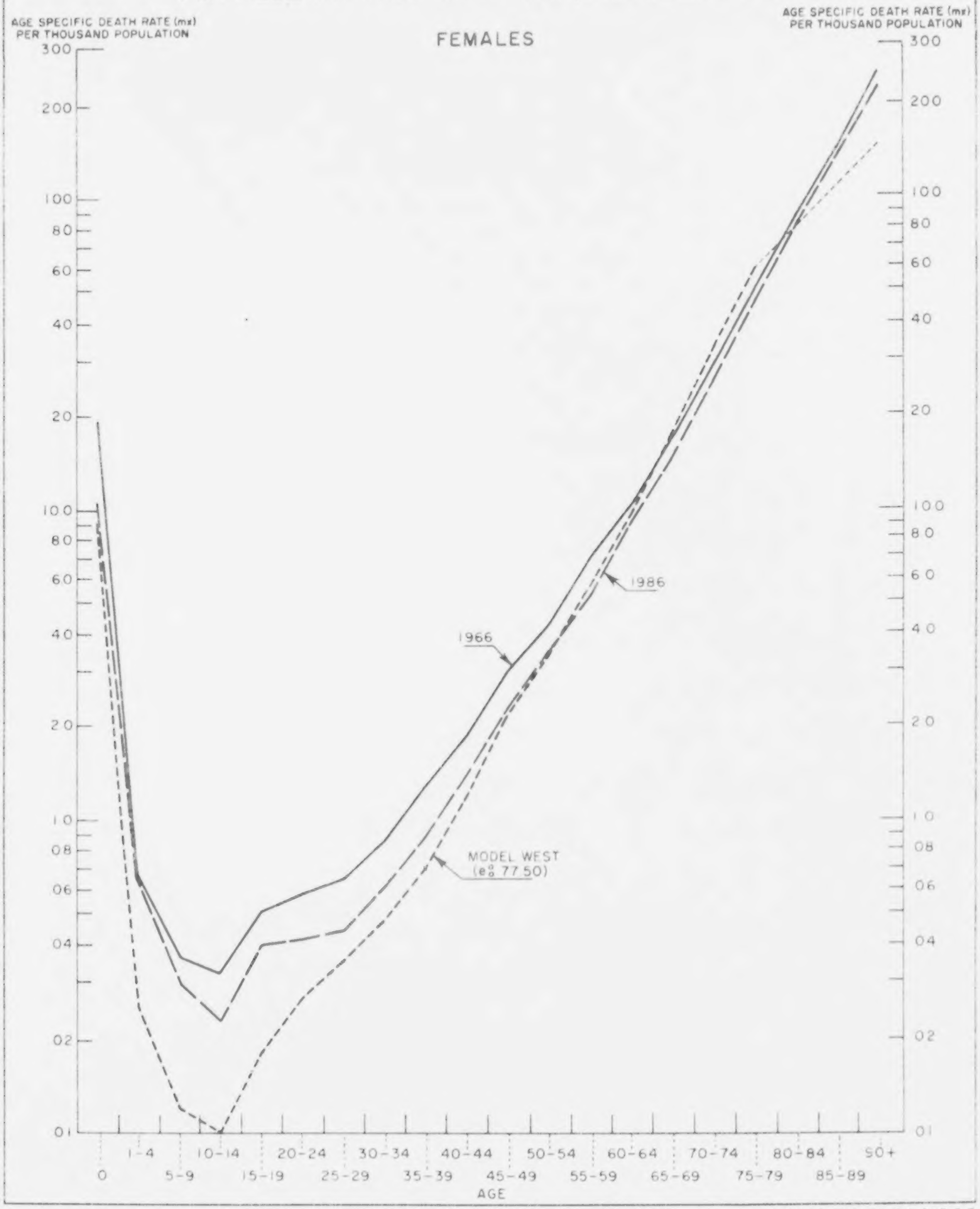
COMPARISON OF AGE PATTERNS OF MORTALITY BY SEX FOR ALBERTA 1986 WITH 1966, AND MODEL WEST



SOURCE: TABLES 3.4 AND 3.7

CHART 3.2b

COMPARISON OF AGE PATTERNS OF MORTALITY BY SEX FOR ALBERTA 1986 WITH 1966, AND MODEL WEST



SOURCE: TABLES 3.4 AND 3.7

Chart 3.2 may be found certain deviations from the model: the postulated infant female mortality rate for Alberta in 1986 is considerably higher than the model value and so are the rates for males and females at the old ages. These are considered in the following discussion.

3.41 Infant Mortality Rate

A chief determinant of mortality level at a given period is infant mortality rate or the number of deaths under one year of age per 1,000 live births in a year. Like the crude death rate, the infant mortality rate of Alberta was lower than the national rate for males and females over the period under study (Tables 3.5a and 3.5b). The differentials in rates between Canada and Alberta had substantially narrowed during 1946-67 with female rates of 19.6 for Canada and 19.1 for Alberta in 1967. For males, the rates were 22.9 and 21.9 per thousand live births, respectively, implying a faster decline at the national level. It should be noted that at the beginning of the period, the difference between Canada and Alberta exceeded by four to eight points a year.

The present level of infant mortality, although low, compares rather unfavourably with the observed rates for countries like Sweden (10.5 for females), the Netherlands (12.5 for females) and Norway (14.9 for females) about the same period. Viewed from this angle, the projected female infant mortality rate of 10.5 is considered

TABLE 3.5a-- Actual and Projected Trends in Infant Mortality Rates for Alberta, Canada and Other Low Mortality Countries, Males, 1946-2000

Year	Alberta	Canada	Sweden	Norway	Netherland
	(Rates per 1000 live births)				
Actual Rate					
1946	48.0	53.0	29.4	38.9	..
1947	40.2	51.8	28.2	40.1	37.5
1948	42.7	49.2	27.0	32.6	32.7
1949	36.1	48.2	26.1	31.6	30.0
1950	35.8	46.2	23.6	32.3	28.2
1951	38.6	42.7	24.4	28.9	28.1
1952	34.4	42.5	22.2	25.8	24.8
1953	32.2	39.8	21.0	24.9	25.2
1954	29.3	35.8	22.0	24.2	23.3
1955	28.7	35.0	19.4	22.8	22.7
1956	28.0	35.0	19.0	24.5	21.6
1957	28.9	34.5	19.9	23.0	19.4
1958	28.8	33.7	18.1	21.5	19.1
1959	28.3	31.8	19.2	21.2	18.9
1960	30.0	30.8	18.9	21.1	18.5
1961	30.8	30.5	17.7	20.3	17.8
1962	28.6	30.6	17.6	20.5	17.3
1963	27.1	29.6	17.4	18.7	17.8
1964	28.2	27.8	15.9	18.0	16.7
1965	26.9	26.2	14.7	18.6	16.1
1966	24.2	25.8	14.5	..	16.8
1967	21.0	24.2	..	..	..
1968	21.9	22.9	..	..	..
1969	..	..	..	..	..
1970	..	..	..	..	..
Projected Rate					
1986	13.2	..	..	..	..
2000					
High	..	16.0	..	..	..
Medium	..	13.2	..	..	..
Low	..	10.5	..	..	..

SOURCES: DBS, Vital Statistics, 1968, Table D.12; United Nations, Demographic Year Book, 1951, 1957 and 1967.

TABLE 3.5b-- Actual and Projected Trends in Infant Mortality Rates for Alberta, Canada and Other Low Mortality Countries, Females, 1946-2000

Year	Alberta	Canada	Sweden	Norway	Netherlands
	(Rates per 1000 live births)				
Actual Rate					
1946	37.0	41.1	23.4	30.1	33.5
1947	33.9	39.4	22.4	28.8	29.3
1948	34.4	38.5	19.2	26.3	25.6
1949	29.7	38.1	20.3	23.5	23.5
1950	28.9	36.5	18.1	23.8	22.0
1951	27.0	34.0	18.6	22.2	21.9
1952	25.7	33.6	17.7	21.4	20.1
1953	27.0	31.0	16.4	18.9	18.8
1954	23.0	27.9	15.2	18.4	18.7
1955	22.9	27.5	15.4	18.3	17.3
1956	20.7	28.7	15.5	17.8	16.2
1957	24.9	27.2	15.5	17.8	14.8
1958	21.5	26.4	13.6	18.4	15.3
1959	19.9	24.7	13.8	16.0	14.5
1960	22.2	23.7	14.2	16.5	14.5
1961	22.7	23.8	13.7	15.3	12.9
1962	22.0	24.3	13.1	14.8	13.3
1963	19.9	22.9	13.2	15.0	13.6
1964	19.7	21.4	12.4	14.7	12.8
1965	21.0	20.8	12.0	19.9	12.7
1966	17.6	20.2	10.5	..	12.5
1967	19.1	19.6	..	..	..
1968	18.3	18.6	..	..	..
1969	..	..	..	..	..
1970	..	..	..	..	..
Projected Rate					
1986	10.5	..	..	..	..
2000					
High	..	12.5	..	..	..
Medium	..	10.5	..	..	..
Low	..	8.6	..	..	..

SOURCES: Same as Table 3.5a.

to be not beyond the realm of achievement in future. In this study, this level is assumed for 1986 which means an average rate of decrease of 2.0 percent a year from 1966. This tempo of decline in female infant mortality rate may be regarded as reasonable in the light of past trends in Alberta which showed an annual reduction of 2.3 percent between 1951 and 1966 according to Table 3.6. Besides, the experiences of the three very low mortality countries cited in Tables 3.5 and 3.6 point out that the rate of decrease of two percent in a year is not something unattainable. Thus, for example, after reaching the level of 19.2 in 1948 that is now obtained in Alberta, the Swedish infant mortality rate for females continued to drop at the average rate of 2.5 percent to 10.5 in 1967, i.e. the level projected for Alberta by 1986. Similarly, the rate of decline was 2.6 percent in the Netherlands during 1953-1966 and 1.8 percent in Norway during 1953-65.

For males, the projected infant mortality rate is 13.2 by 1986. Unlike the case of females, this level has not been observed yet in a population, and the recorded low was 14.5 in Sweden during 1966 as shown by Chart 3.3. Nevertheless, this level is held reasonable for the following two main reasons. First, the male infant mortality has, judging by historical trends, always exceeded by about one-fifth to one-third of the female rate. On this basis, the assumption of an infant mortality rate of 10.5 for females by 1986 will suggest a rate

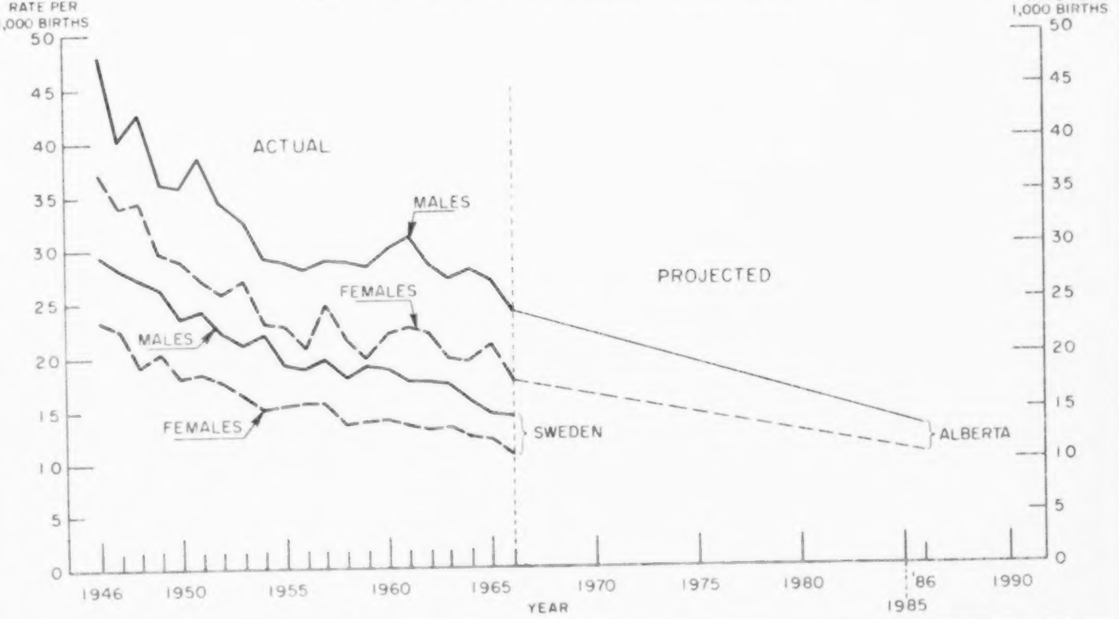
TABLE 3.6 -- Rate of Decline in Infant Mortality Rate by Sex for Alberta, Canada and Other Low Mortality Countries, 1946-2000

Province/Country	Period	Length of Period in Years	Rate of Decline	
			Total	Annual
	(Figures in percentages)			
Males				
Actual				
Alberta	1951-1966	15	37.3	2.5
Canada	1951-1966	15	39.6	2.6
Sweden	1952-1967	15	34.7	2.3
	1946-1952	6	24.5	4.1
Norway	1958-1965	7	13.5	1.9
	1946-1958	12	44.7	3.7
Netherlands	1956-1966	10	22.2	2.2
	1947-1956	9	42.4	4.7
Projected				
Alberta	1966-1986	20	45.5	2.2
Canada				
High	1965-2000	35	38.9	1.1
Medium	1965-2000	35	49.6	1.4
Low	1965-2000	35	59.9	1.7
Females				
Actual				
Alberta	1951-1966	15	34.8	2.3
Canada	1951-1966	15	40.6	2.7
Sweden	1948-1966	18	45.3	2.5
	1946-1948	2	17.9	8.9
Norway	1953-1965	12	21.2	1.8
	1946-1953	7	37.2	5.3
Netherlands	1953-1966	13	33.5	2.6
	1946-1953	7	43.9	6.3
Projected				
Alberta	1966-1986	20	40.3	2.0
Canada				
High	1965-2000	35	39.9	1.1
Medium	1965-2000	35	49.5	1.4
Low	1965-2000	35	58.7	1.7

SOURCES: Based on Tables 3.5a and 3.5b.

CHART 3.3

INFANT MORTALITY RATES
FOR ALBERTA AND SWEDEN 1946-1986



SOURCE TABLES 3.5a AND 3.5b

somewhere between 12.6 and 14.0 for males. The level of 13.2 implying an excess male mortality of 26 percent is, therefore, not an unrealistic assumption. Secondly, the implied annual decline of 2.3 percent in male infant mortality rate conforms rather well with the past trend of 2.5 percent during 1951-1966. Furthermore, according to Table 3.6, the international experience after attaining the level of about 22 for males showed an average annual reduction of 2.3 percent in Sweden during 1952 to 1967, 1.9 percent in Norway (1958 to 1965) and 2.2 percent in the Netherlands (1956 to 1966).

3.42 Mortality in Ages 1 to 14

The extent of assumed reductions in mortality at other ages is shown in Table 3.7. Generally, these reductions are less than that predicted for the infant mortality rate. For the young ages, the expected decline is meagre as they have already reached the rock bottom in low mortality areas.

The unrecorded male mortality of 0.37 per thousand people in the age group 5-9 for the period 1965-67 (i.e. 1966 life table) was unusually low compared to the rates for the adjoining age groups, and the female rate of this age group for the same period. In fact, the rate is lower than projected under low mortality assumption for Canada in 2000 A.D. (Table 3.4). According to the "West" model reflecting a male expectation of life at birth of 71.9

TABLE 3.7 -- Projected Trends in Age Specific Death Rates by Sex, Alberta, 1966 to 1986

Age group and sex	1966[a]	1986	Total decline from 1966 to 1986	Average quinquennial decline
	1000 m_x	1000 m_x	%	%
	(Rate per 1000 population)			
Males				
0	24.58	13.22	46.22	11.56
1-4	0.87	0.80	8.05	2.01
5-9	0.36	0.48	b	b
10-14	0.51	0.40	21.57	5.39
15-19	1.37	1.06	22.63	5.66
20-24	2.07	1.58	23.68	5.92
25-29	1.77	1.33	24.86	6.21
30-34	1.72	1.35	21.52	5.38
35-39	2.06	1.69	17.97	4.49
40-44	3.27	2.73	16.52	4.13
45-49	4.77	4.35	8.81	2.20
50-54	8.31	7.45	10.35	2.59
55-59	13.18	11.80	10.48	2.62
60-64	20.47	19.37	5.38	1.35
65-69	31.24	28.74	8.01	2.00
70-74	46.27	45.88	0.85	0.21
75-79	73.59	71.28	3.14	0.79
80-84	114.72	112.50	1.94	0.49
85-89	164.46	159.45	3.05	0.76
90+	276.57	252.77	8.61	2.15
Females				
0	19.70	10.52	46.60	11.65
1-4	0.67	0.66	1.50	0.37
5-9	0.36	0.30	16.67	4.17
10-14	0.32	0.23	28.13	7.03
15-19	0.51	0.40	21.57	5.39
20-24	0.58	0.42	27.59	6.90
25-29	0.65	0.44	32.31	8.08
30-34	0.86	0.61	29.07	7.27
35-39	1.28	0.88	31.25	7.81
40-44	1.86	1.36	26.88	6.72
45-49	2.99	2.21	26.09	6.52
50-54	4.35	3.48	20.00	5.00
55-59	7.07	5.31	24.90	6.23
60-64	10.27	9.06	11.79	2.95
65-69	17.26	14.54	15.76	3.94
70-74	28.58	25.58	10.50	2.63
75-79	49.20	45.59	7.34	1.84
80-84	86.05	80.06	6.97	1.74
85-89	142.86	133.14	6.81	1.70
90+	246.00	222.56	9.53	2.38

[a] Rates (1000 m_x) are obtained by averaging the values for 1965, 1966 and 1967.

[b] A constant level of 0.48 is assumed throughout the projection period.

SOURCES: DBS, Vital Statistics (annual), 1965 to 1967; and Table 3.4.

years, the age specific mortality rate for this group is 0.45 per thousand population (Table 3.4). The initial level is considered anomalous in this study and therefore, the level under medium pattern for Canada of 0.48 per thousand is assumed for this age group through 1986.

3.43 Adult Mortality Rates

By far the largest reductions are anticipated to take place in the adult age groups during the projection period. In Table 3.7, the average quinquennial decline in the ages 15 to 55 is between five to eight percent for females during 1966 to 1986. For males, the projected decline is in the range of two to six percent per five years.

At the national level, the principal causes of deaths in these age groups are accidents, cancer, heart diseases and suicide. Besides, maternal deaths account for a good portion among the adult women. The age specific data by causes of death are not published for the provinces. Nevertheless, some explanations for these reductions are attempted in Section 3.45.

3.44 Mortality at Old Ages

Unlike the adult age groups, the projected decline in mortality at the old ages is the least according to Table 3.7. The rates for females average about two percent per quinquennium. For males, the specific rates of age groups 85-89 and 90+ for the base period 1965-67 are actually lower than the projected values, under medium series, for Canada by 2000. Therefore, the rates of low mortality series for Canada (Table 3.4) are assumed for these two age groups for 1986. Based on this assumption, the reduction in male mortality at old ages is expected to be less than one percent in five years.

In recent years, increases in death rates for males in some or all of the age groups over 50 or 55 years have been reported notably in two of our model countries, Norway and the Netherlands (United Nations, 1963). Some demographers tend to interpret these tendencies as indicating a reversal of the long range downward trend of mortality for older men. There is, however, little evidence of any such tendency among specific mortality rates for women. Here, no assumption is made either for males or females to imply an increase in mortality rates for either males or females.

3.45 Causes of Deaths

The cause of death statistics for all ages by sex are available in considerable details for Alberta. The numerous causes of death are classified into ten major groups[4] for the purpose of preparing mortality projections. These are: (I) infectious and parasitic diseases,

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[4] In DBS, Vital Statistics Report, all diseases are divided into seventeen major groups under the present classification scheme. These are recast for the purpose of projections into ten major groups (see George, 1969).

(II) malignant neoplasms, (III) diabetes, (IV) coronary diseases, (V) other cardiovascular-renal diseases, (VI) diseases of the respiratory system, (VII) diseases of the digestive system and early infancy, (VIII) congenital malformations, (IX) accidents, and (X) all other causes. The diseases included in each group are listed in Table 3.8 by their code numbers given in the DBS Vital Statistics Report. Before proceeding to examine the structure of projected mortality by causes of death, it may be explained that the figures for 1986 in Table 3.8 are obtained by applying the projected age specific rates by causes of death for Canada[5] to the corresponding 1966 census population of Alberta by age and sex.

At the beginning of the projection period, the coronary diseases, other cardiovascular and renal diseases, cancer and accidents, in that order, ranked as the main causes of death among males (see Chart 3.4). For women, the order was slightly different with cardiovascular and renal diseases (Group V) ranking number one, followed by coronary diseases and cancer. Accidents were relatively fewer among women, and the fourth major cause of female deaths was therefore accounted by diseases of the digestive system and early infancy. The pattern was generally similar to the situation in Canada.

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[5] The projections are made in terms of cause specific death rates by age and sex, and are available for Canada for the year 2000. See George, 1969.

TABLE 3.8 -- Actual and Projected Death Rates by Cause and Sex, Alberta, 1966 and 1986

Cause of death and sex	Diseases included in the group[a]	Rate per 100,000 population		Percentage Change from 1966 to 1986
		1966[b]	1986[c]	
MALES				
I. Infections and parasatic diseases	A1 to A43	6.4	0	-100.00
II. Malignant neoplasms	A44 to A60	130.8	98.5	- 24.7
III. Diabetes	A63	10.4	6.1	- 41.7
IV. Coronary diseases	A81	244.0	168.3	- 31.0
V. Other cardiovascular-renal diseases	A70 to A80 and A82 to A86	131.6	83.8	- 36.3
VI. Diseases of the respiratory system	A87 to A97	55.4	36.2	- 34.4
VII. Diseases of the digestive system and early infancy	A98 to A107 and A130 to A135	67.4	13.2	- 80.5
VIII. Congenital malformations	A127 to A129	11.5	7.4	- 3.5
IX. Accidents	AE138 to AE150	99.6	55.0	- 44.8
X. All other causes	A61, A62, A64 to A69, A108 to A126, A136 and A137	52.0	28.9	- 44.5
FEMALES				
I. Infections and parasatic diseases	A1 to A43	4.1	0	-100.00
II. Malignant neoplasms	A44 to A60	100.6	58.0	- 42.0
III. Diabetes	A63	10.1	7.8	- 22.0
IV. Coronary diseases	A81	117.0	113.8	- 2.7
V. Other cardiovascular-renal diseases	A70 to A80 and A82 to A86	115.6	82.1	- 29.0
VI. Diseases of the respiratory system	A87 to A97	31.3	22.5	- 28.2
VII. Diseases of the digestive system and early infancy	A98 to A107 and A130 to A135	47.6	8.9	- 81.3
VIII. Congenital malformations	A127 to A129	9.7	8.8	- 9.5
IX. Accidents	AE138 to AE150	35.3	26.0	- 26.3
X. All other causes	A61, A62, A64, to A69, A108 to A126, A136 and A137	49.3	18.8	- 61.8

[a] The code numbers in this column correspond to the Intermediate List numbers of the International Statistical Classification of Diseases, Injuries and Causes of Death (Seventh Revision). For details see DBS, Vital Statistics, 1968, Table D.8.

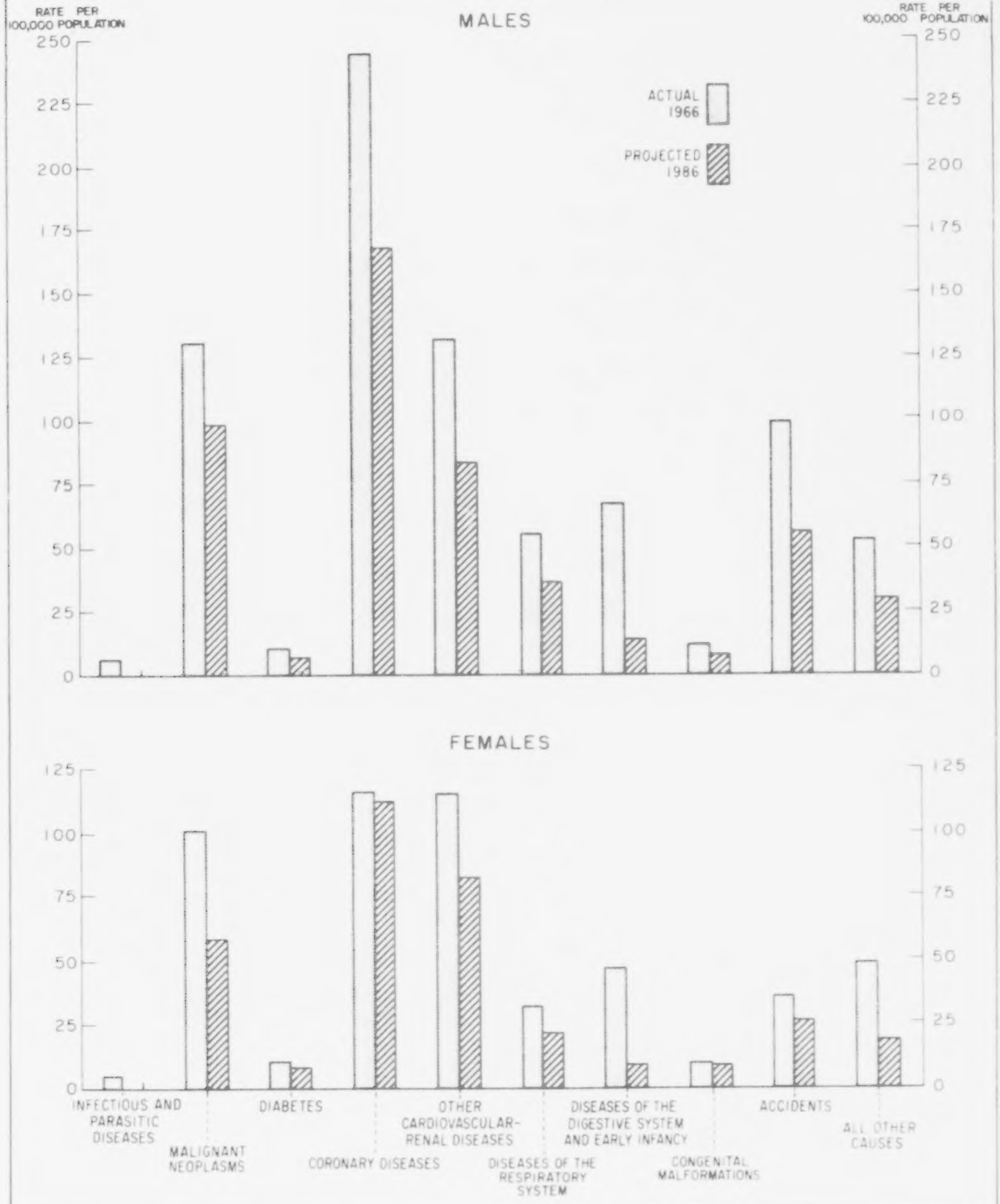
[b] Rates are the unweighted averages of the period 1965-67.

[c] Rates are based on the 1966 census population by age groups and sex. See text.

SOURCES: DBS, Vital Statistics (annual) 1965-1967; M. V. George, "Projections of Mortality to 2000 by Causes of Death in Canada, Tables 5a and 5b.

CHART 3.4

CAUSE-SPECIFIC DEATH RATES BY SEX, ALBERTA, 1966 AND 1986



SOURCE TABLE 3.8

Over the coming years, the infectious and parasitic diseases are assumed to disappear gradually. The second largest reduction (80 percent between 1966 and 1986) is anticipated for both sexes in diseases of the digestive system and early infancy. The assumed reductions for other causes are seen in Chart 3.4 to vary widely by sex. Cancer mortality is anticipated to drop at a faster rate for females than for males and reach a level of 58 per 100,000 population by 1986. The present rate is about 100 for females which means a decline of 42 percent in twenty years from 1966 to 1986. The male rate is forecast to decline from about 131 to 98 per 100,000 or by just 25 percent during the same period. Deaths due to all other causes (Group X) are also expected to fall more rapidly among women during the projection period.

For men, two major causes, namely coronary diseases and accident mortality, are assumed in this study to diminish more rapidly than for women. In the case of women, the supposed reduction is about 3 percent compared to a decrease of 30 percent for males during 1966-1986. The male accident mortality is assumed rather optimistically to decline from about 100 to 55 per 100,000 or by 45 percent in this period. The expected reduction for females is about 26 percent (Table 3.8).

Diseases of the respiratory system and other cardiovascular-renal diseases among men are expected to come down at a slightly faster rate than among women. The implied rate of reduction for males is about 34 and 36 percent, respectively, and 29 percent for females for each group.

3.5 Life Tables for Alberta

The preceding discussion was devoted to the projection of mortality level and pattern for Alberta and the explanation of the procedures and assumptions involved. The final step in the projection exercise is the construction of life tables and the calculation of required survival ratios for preparing population projections. Because population projections are to be made in this study by single years of age and sex for 15 years from 1970 to 1985, survival ratios by single ages are needed for each year of the projection period.

Ideally, the survival ratios (S_x) by single years of age can be derived from a complete life table. But, the assumed mortality patterns presented in Table 3.4 for 1986 are in five year age groups by sex, which prevented the construction of a complete life table. Hence, an abridged life table was constructed first and then survival ratios by single years of age were obtained from life table population by five year age groups ($5^L x$) after graduating the data into single years of age ($1^L x$) using the Sprague multipliers.

3.51 Abridged Life Tables

The life tables for Alberta are constructed here using the Greville method (Jaffe, 1951, Chapter 2) and the age specific mortality rates (q_x values) for 1986 presented in Table 3.4. The q_x values for the years 1971, 1976 and 1981 are obtained by linear interpolation of similar rates by sex for 1966 and projected for 1986. The abridged life tables for these years are calculated mainly for evaluation of the assumed mortality for the intervening years of the projection period. Like the expectation of life at birth, the values of expectation of life at different ages are superior indices of the mortality picture at various points of time (see Table 3.9).

3.52 Survival Ratios by Single Years of Age

The S_x values, which are very crucial to the preparation of population projections, denote the proportions of population aged x (say, 5 years old) who will survive to the next age (6 years old) in twelve months. It is calculated by dividing L_{x+1} (life table population in the present example, at age 6 years) by L_x (life table population at age 5). Use of the Sprague multipliers (Jaffe, 1951, Chapter 4) for calculating the survival ratios by single years of age has been found satisfactory except for ages below 15. For these ages, the S_x values are adjusted by taking into account the trend in the life table population of adjoining ages and the survival ratios for the relevant five-year age group. These ratios by single years of age for males and females, derived from the

TABLE 3.9 -- Projected Gains in Expectation of Life at Birth by Sex for Alberta through 1986

Year	Males		Females	
	Expectation of life at birth (years)	Annual gain since preceding date	Expectation of life at birth (years)	Annual gain since preceding date
1966[a]	70.10	..	76.24	..
1971	70.53	.09	76.88	0.13
1976	70.99	.09	77.40	0.13
1981	71.47	.09	77.99	0.12
1986	71.94	.09	78.57	0.12

[a] Figures are for 1965-67.

SOURCE: Table 3.2 and Appendix Tables D.2 and D.3.

respective abridged life table for 1986, are given in Tables 3.10a and 3.10b, respectively. The required survival ratios for each year from 1970 to 1985 were interpolated from the values in Tables 3.10a and 3.10b, assuming a constant annual rate of change over the respective five-year period.

TABLE 3.10a -- Life Table (1965-67) and Projected Survival
Ratios by Single Years of Age for Males, Alberta
1970, 1975, 1980, 1985 and 1986

Age	1965-67	1970	1975	1980	1985	1986
	[Single year survival ratios (S_x values)]					
0	.97847	.98023	.98242	.98462	.98681	.98725
1	.99677	.99678	.99678	.99679	.99680	.99680
2	.99870	.99871	.99871	.99872	.99873	.99873
3	.99916	.99917	.99917	.99918	.99919	.99919
4	.99955	.99956	.99956	.99957	.99958	.99958
5	.99960	.99958	.99956	.99954	.99952	.99952
6	.99965	.99963	.99961	.99959	.99957	.99957
7	.99967	.99965	.99963	.99962	.99959	.99959
8	.99971	.99969	.99967	.99965	.99963	.99963
9	.99972	.99970	.99968	.99966	.99964	.99964
10	.99969	.99970	.99971	.99972	.99974	.99974
11	.99965	.99967	.99970	.99973	.99976	.99977
12	.99957	.99961	.99965	.99970	.99974	.99975
13	.99944	.99948	.99952	.99957	.99961	.99962
14	.99930	.99934	.99938	.99943	.99947	.99948
15	.99910	.99914	.99920	.99925	.99931	.99932
16	.99891	.99899	.99909	.99918	.99928	.99930
17	.99871	.99879	.99888	.99898	.99907	.99909
18	.99856	.99861	.99868	.99874	.99881	.99882
19	.99837	.99842	.99849	.99856	.99863	.99864
20	.99821	.99829	.99838	.99848	.99857	.99859
21	.99805	.99815	.99827	.99840	.99852	.99855
22	.99796	.99807	.99822	.99836	.99850	.99853
23	.99793	.99805	.99821	.99836	.99852	.99855
24	.99794	.99806	.99822	.99837	.99853	.99856
25	.99803	.99813	.99825	.99837	.99849	.99851
26	.99811	.99818	.99827	.99835	.99844	.99846
27	.99818	.99825	.99834	.99842	.99851	.99853
28	.99824	.99833	.99843	.99854	.99865	.99867
29	.99826	.99836	.99848	.99860	.99873	.99875
30	.99831	.99839	.99849	.99858	.99868	.99870
31	.99830	.99837	.99845	.99854	.99862	.99864
32	.99831	.99838	.99846	.99854	.99862	.99864
33	.99828	.99836	.99845	.99855	.99864	.99866
34	.99826	.99833	.99842	.99851	.99860	.99862
35	.99820	.99826	.99835	.99843	.99851	.99853
36	.99813	.99819	.99826	.99833	.99841	.99842
37	.99801	.99807	.99814	.99822	.99829	.99831
38	.99785	.99792	.99801	.99809	.99818	.99820
39	.99766	.99774	.99783	.99893	.99802	.99804
40	.99744	.99752	.99762	.99772	.99782	.99784
41	.99718	.99726	.99736	.99747	.99757	.99760
42	.99693	.99702	.99714	.99725	.99737	.99740
43	.99665	.99676	.99689	.99703	.99716	.99719
44	.99641	.99651	.99664	.99677	.99690	.99693

TABLE 3.10a -- (continued)

Age	1965-67	1970	1975	1980	1985	1986
	[Single year survival ratios (S_x values)]					
45	.99615	.99623	.99633	.99643	.99653	.99655
46	.99584	.99590	.99598	.99605	.99613	.99615
47	.99546	.99552	.99559	.99566	.99574	.99575
48	.99495	.99502	.99511	.99520	.99529	.99531
49	.99438	.99447	.99458	.99469	.99480	.99482
50	.99370	.99380	.99393	.99406	.99419	.99422
51	.99297	.99309	.99324	.99339	.99355	.99358
52	.99217	.99233	.99253	.99272	.99292	.99296
53	.99134	.99153	.99177	.99200	.99224	.99229
54	.99048	.99069	.99095	.99122	.99148	.99154
55	.98955	.98977	.99005	.99033	.99060	.99066
56	.98855	.98879	.98909	.98938	.98968	.98974
57	.98747	.98770	.98798	.98827	.98855	.98861
58	.98628	.98649	.98676	.98702	.98729	.98734
59	.98500	.98521	.98547	.98573	.98599	.98604
60	.98364	.98387	.98416	.98445	.98474	.98480
61	.98217	.98242	.98273	.98304	.98335	.98341
62	.98057	.98084	.98118	.98152	.98186	.98193
63	.97884	.97913	.97950	.97987	.98024	.98031
64	.97696	.97728	.97769	.97809	.97850	.97858
65	.97500	.97535	.97579	.97622	.97666	.97675
66	.97283	.97323	.97373	.97424	.97474	.97484
67	.97053	.97092	.97140	.97189	.97237	.97247
68	.96807	.96841	.96884	.96927	.96970	.96979
69	.96550	.96581	.96619	.96657	.96695	.96703
70	.96283	.96316	.96356	.96397	.96438	.96446
71	.95980	.96021	.96071	.96122	.96173	.96183
72	.95638	.95692	.95759	.95826	.95893	.95906
73	.95233	.95345	.95485	.95624	.95764	.95792
74	.94784	.94890	.95023	.95156	.95288	.96315
75	.94293	.94330	.94375	.94421	.94467	.94476
76	.93753	.93820	.93903	.93987	.94070	.94087
77	.93169	.93236	.93319	.93403	.93486	.93503
78	.92538	.92589	.92654	.92718	.92782	.92795
79	.91860	.91905	.91962	.92018	.92075	.92086
80	.91133	.91205	.91295	.91386	.91476	.91494
81	.90364	.90459	.90577	.90696	.90813	.90837
82	.89544	.89655	.89793	.89932	.90070	.90098
83	.88668	.88797	.88958	.89119	.89280	.89312
84	.87757	.87900	.88079	.88258	.88437	.88473
85	.86785	.86945	.87146	.87346	.87547	.87587
86	.85771	.85950	.86173	.86396	.86619	.86664
87	.84707	.84911	.85167	.85422	.85678	.85729
88	.83571	.83826	.84144	.84463	.84781	.84845
89	.81178	.81764	.82496	.83228	.83960	.84106
90+	.76708	.77261	.77953	.78645	.79337	.79475

SOURCE: DBS, Life Tables; Canada and Provinces, 1965-67, Catalogue No. 84-527, 1971, pp. 48-51.

TABLE 3.10b-- Life Table (1965-67 and Projected Survival Ratios by Single Years of Age for Females, Alberta 1970, 1975, 1980, 1985 and 1986

Age	1965-67	1970	1975	1980	1985	1986
	[Single year survival ratios (S_x values)]					
0	.98337	.98464	.98623	.98781	.98940	.98972
1	.99703	.99705	.99708	.99711	.99714	.99715
2	.99889	.99891	.99894	.99897	.99900	.99901
3	.99956	.99958	.99961	.99964	.99967	.99968
4	.99951	.99953	.99956	.99959	.99962	.99963
5	.99962	.99964	.99967	.99970	.99973	.99974
6	.99965	.99967	.99969	.99971	.99973	.99973
7	.99966	.99968	.99970	.99972	.99974	.99974
8	.99967	.99969	.99971	.99973	.99975	.99975
9	.99970	.99972	.99974	.99976	.99978	.99978
10	.99969	.99971	.99973	.99975	.99977	.99977
11	.99970	.99972	.99974	.99977	.99979	.99980
12	.99969	.99971	.99973	.99975	.99978	.99978
13	.99967	.99969	.99971	.99973	.99976	.99976
14	.99963	.99965	.99967	.99969	.99972	.99972
15	.99960	.99962	.99964	.99967	.99969	.99970
16	.99955	.99957	.99960	.99963	.99966	.99967
17	.99952	.99955	.99958	.99961	.99964	.99965
18	.99948	.99951	.99954	.99958	.99961	.99962
19	.99947	.99949	.99952	.99955	.99957	.99958
20	.99946	.99948	.99951	.99954	.99956	.99957
21	.99942	.99945	.99948	.99952	.99955	.99956
22	.99943	.99946	.99949	.99953	.99956	.99957
23	.99940	.99944	.99948	.99953	.99957	.99958
24	.99940	.99944	.99949	.99953	.99958	.99959
25	.99939	.99943	.99948	.99952	.99957	.99958
26	.99938	.99941	.99946	.99950	.99954	.99955
27	.99936	.99940	.99944	.99949	.99953	.99954
28	.99934	.99938	.99943	.99947	.99952	.99953
29	.99930	.99934	.99940	.99945	.99951	.99952
30	.99928	.99932	.99937	.99943	.99948	.99949
31	.99921	.99926	.99932	.99938	.99944	.99945
32	.99918	.99923	.99929	.99935	.99941	.99942
33	.99912	.99917	.99924	.99930	.99937	.99938
34	.99902	.99908	.99916	.99924	.99931	.99933
35	.99897	.99903	.99910	.99917	.99925	.99926
36	.99887	.99894	.99902	.99910	.99918	.99920
37	.99878	.99885	.99895	.99904	.99913	.99915
38	.99868	.99876	.99886	.99896	.99906	.99908
39	.99859	.99867	.99878	.99888	.99899	.99901
40	.99846	.99855	.99866	.99877	.99889	.99891
41	.99836	.99845	.99855	.99866	.99877	.99879
42	.99822	.99831	.99843	.99854	.99866	.99868
43	.99805	.99815	.99827	.99840	.99852	.99855
44	.99785	.99796	.99811	.99825	.99839	.99842

TABLE 3.10b-- (continued)

Age	1965-67	1970	1975	1980	1985	1986
	[Single year survival ratios (S_x values)]					
45	.99764	.99776	.99792	.99807	.99823	.99826
46	.99741	.99754	.99770	.99786	.99803	.99806
47	.99716	.99730	.99748	.99766	.99784	.99788
48	.99692	.99707	.99726	.99745	.99764	.99768
49	.99668	.99684	.99703	.99723	.99742	.99746
50	.99643	.99658	.99676	.99694	.99712	.99716
51	.99617	.99631	.99649	.99667	.99684	.99688
52	.99583	.99600	.99621	.99642	.99663	.99667
53	.99541	.99562	.99588	.99614	.99640	.99645
54	.99497	.99521	.99551	.99581	.99611	.99617
55	.99443	.99469	.99502	.99535	.99567	.99574
56	.99387	.99415	.99449	.99484	.99518	.99525
57	.99330	.99360	.99397	.99434	.99472	.99479
58	.99272	.99303	.99342	.99381	.99420	.99428
59	.99219	.99249	.99287	.99325	.99362	.99370
60	.99163	.99190	.99223	.99257	.99290	.99297
61	.99100	.99124	.99153	.99183	.99212	.99218
62	.99022	.99047	.99078	.99109	.99140	.99146
63	.98922	.98952	.98989	.99026	.99063	.99070
64	.98811	.98844	.98886	.98928	.98970	.98978
65	.98684	.98719	.98762	.98805	.98848	.98857
66	.98541	.98578	.98624	.98670	.98716	.98725
67	.98380	.98423	.98476	.98529	.98582	.98593
68	.98205	.98254	.98315	.98376	.98437	.98449
69	.98015	.98068	.98135	.98202	.98269	.98282
70	.97815	.97873	.97945	.98017	.98089	.98103
71	.97582	.97641	.97716	.97790	.97864	.97879
72	.97318	.97374	.97444	.97514	.97584	.97598
73	.97012	.97065	.97131	.97198	.97264	.97278
74	.96676	.96728	.96793	.96858	.96923	.96936
75	.96313	.96382	.96467	.96553	.96639	.96656
76	.95897	.95982	.96087	.96193	.96299	.96320
77	.95422	.95499	.95596	.95693	.95790	.95809
78	.94886	.94953	.95037	.95120	.95204	.95221
79	.94294	.94356	.94433	.94511	.94588	.94604
80	.93646	.93731	.93836	.93942	.94048	.94069
81	.92928	.93051	.93206	.93360	.93514	.93545
82	.92127	.92282	.92475	.92669	.92862	.92901
83	.91239	.91430	.91668	.91906	.92144	.92192
84	.90274	.90498	.90779	.91059	.91340	.91396
85	.89229	.89481	.89796	.90112	.90427	.90490
86	.88095	.88364	.88699	.89035	.89371	.89438
87	.86852	.87122	.87460	.87798	.88136	.88204
88	.85494	.85736	.86038	.86340	.86642	.86703
89	.84051	.84210	.84409	.84607	.84806	.84846
90+	.76899	.77044	.77226	.77408	.77590	.77626

SOURCE: Same as Table 3.10a.

FERTILITY PROJECTIONS:
A COHORT APPROACH

4.1 Introduction

Of the three components of population change involved in population projections, fertility and migration are the most difficult components to project. However, the fertility component is the largest contributor to population growth. Besides, unlike mortality, fertility trends are subject to greater fluctuation with no specific pattern and are directly dependent on individual behaviour. Because of these and the importance of the component, fertility projections require greater attention in terms of data and procedures. In fact, a thorough knowledge of the demographic and non-demographic factors underlying fertility variations--changes in the age structure of the population, nuptiality rates and habits, timing of births, macro and micro socio-economic changes and their impact on the social, economic and psychological motivations influencing the attitudes of individuals and families towards fertility --is crucial for fertility projections.

4.2 The Cohort Versus Period Method

Period and cohort methods are the two basic approaches that are generally adopted for fertility analysis and projections. Under the period method, fertility rates (i.e., births in a year per 1,000 women of a particular age or women of childbearing age) based on the sum of age-specific fertility rates of all cohorts of women of childbearing ages during a calendar year are analyzed and projected. The cohort or longitudinal approach on the other hand, consists of following the changes in the reproductive performance of actual cohorts of women through their entire reproductive span (for an illustration of the two approaches, see Romaniuk, 1970, pp. 7-8). Thus, if m_x and f_x denote age-specific period and cohort fertility rates, respectively, the sum of the former $\sum_{x=15}^{49} m_x$ gives the total number of births per woman of the cohort over the entire childbearing span, while the sum of the latter $\sum_{x=15}^{49} f_x$ gives the total number of births per woman which occur to the cohorts in the childbearing age at a particular point in time. The sum of the m_x and the sum of the f_x are referred to as "Completed Fertility Rate" (CFR) and "Total Fertility Rate" (TFR), respectively, in this study.[1] A cohort (of women) is defined here as birth cohorts, i.e., a group of women born during a calendar year. Because of the dearth of required data and the problems involved in generating cohort fertility rates and converting them into period rates, the simple period approach, using calendar year fertility rates, is generally adopted for fertility projections. Except for the recent national population projections for Canada by the Dominion Bureau of Statistics, the period fertility method has been used in the past for population projections for Canada and the provinces. After analyzing briefly the past trends and patterns of fertility in Alberta using period and cohort fertility rates, a cohort method is used in the present projections.

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[1] The Total Fertility Rate (TFR) is defined as the average number of children born to a hypothetical cohort of women if they experienced no mortality and were subjected to the same schedule of age-specific fertility rates as observed during a calendar year.

The advantages of the cohort approach over the period approach for fertility analysis and projections have been discussed at length by Whelpton and Ryder, and are well documented (Whelpton and Campbell, 1960, pp. 10-11; Whelpton, 1954; Ryder, 1951, C. 2 and 4). From the point of fertility projections, the following advantages may be mentioned. First, in a country or province where family planning is practiced widely and successfully, large proportions of couples plan the number and spacing of their children according to the prevailing economic and other conditions. As a result, notable fluctuations generally occur in the annual fertility rates of the area concerned, even though the completed fertility rates or family size remain almost unchanged. This is because "change in the timing of births from one age pattern to another has its maximum influence on annual rates while it is in progress and may have no influence later on" (Whelpton and Campbell, 1960, p. 11). For example, the dramatic increase in total fertility rate during the post-war period in industrialized countries was due to the combined effect of making up for earlier postponements together with earlier childbearing. The origin of this fluctuation in period fertility could not have been explained properly without resorting to cohort analysis. Secondly, the annual fluctuations in the period fertility rates make it extremely difficult to make any meaningful use of the past trend in fertility for projecting the future course of fertility. In contrast, cohort approach, from which it is possible to derive fertility rates not affected by changes in the timing of births (distribution of births by age of mother), makes it possible to base fertility assumptions in terms of completed fertility of real cohorts of women, so that unreasonable assumptions concerning completed family size can be minimized. Furthermore, because of the possibility to make use of the previous experience of real cohorts, the information on the total number of children women at each age have had by the beginning of the projection period serves as a firm footing for projecting the completed fertility level of the various cohorts. Thus, projections can be made for real cohorts separately in terms of completed fertility, and the age pattern of fertility. According to Ryder, "in making any forecast it is important to reconstruct the implicit cohort histories, rather than project period by period as if there were no real people, with real life cycles implicated in the statistics" (Ryder, 1970, p. 243). All these considerations and the possibility of developing cohort fertility data for Alberta influenced the decision to adopt the cohort approach in the present projections.

4.3 Fertility Trends Since 1921 (Period Approach)

Some knowledge of past trends is an essential requisite in projection work. Because birth rate is directly dependent upon human behaviour and has varied widely, an analysis of past trends of fertility would be helpful in the formation of assumptions concerning future trends and patterns.

Registered birth data for a historical analysis for Alberta are available only since 1921. However, another measure of fertility, the ratio of children to women of childbearing ages, is available for census years since 1901, and can be used to depict the historical trend of fertility in Alberta for the period before 1921. The ratios of children under age 5 to women 20-44 years of age show an uninterrupted decline from 1901 to 1941. The long-term declining trend in fertility was heavily interrupted by the persistence of an upward trend in fertility during the post-World War period while the birth rate dropped again since 1955. The child-woman ratios expressed per 1,000 women declined from 955 in 1901 to 541 in 1941, increased to 684 in 1951, 811 in 1961, and again dropped to 740 in 1966 (DBS, 1968, p. 6). Similar decline has occurred in Canada since

1850 to 1941 with the exception of a slight increase in fertility between 1901 and 1911. The decline in child-woman ratio was much faster in Alberta than for Canada, particularly during the recent period. For Canada the ratios declined from 716 in 1911 to 502 in 1941, increased to 660 in 1951, 741 in 1961, and again dropped to 679 in 1966 (Table 4.6).

The child-woman ratios and the crude birth rates (annual number of births per 1,000 mid-year population) show that as in Canada, the long-term trend of fertility in Alberta has been downward and that great decrease has occurred. The crude birth rate during the recent period of fertility decline dropped by 37.8 percent from 31.8 in 1954 to 19.8 in 1969, the lowest rate ever recorded for Alberta. The lowest rate previously recorded was 20.3 in 1938. The decline was faster during the recent period of fertility decline than the decline in the 1930's. While the average annual decline in birth rate between 1921 and 1938 was 1.64 percent, the corresponding percentage decline between 1954 and 1969 was 2.52 percent. Table 4.1 presents the trends and level of crude birth rate for Alberta since 1921.

4.31 The Influence of the Age Factor on Crude Birth Rate

The crude birth rate gives only a rough image of the real level of fertility as it relates to a group of individuals, of whom only a small proportion, i.e., women in the childbearing ages, are exposed to the risk of

TABLE 4.1 -- Crude Birth Rates (births per 1,000 population), Alberta, 1921-1969

Year	Rate	Year	Rate	Year	Rate	Year	Rate	Year	Rate
1921	28.1	1931	23.6	1941	21.7	1951	28.8	1961	29.2
1922	27.3	1932	23.0	1942	23.6	1952	29.9	1962	28.3
1923	25.4	1933	21.5	1943	24.6	1953	31.0	1963	27.4
1924	24.5	1934	21.4	1944	24.0	1954	31.8	1964	25.3
1925	24.8	1935	21.2	1945	24.7	1955	31.5	1965	22.5
1926	23.8	1936	20.4	1946	27.6	1956	31.1	1966	20.9
1927	23.5	1937	20.5	1947	29.9	1957	30.7	1967	20.6
1928	23.8	1938	20.3	1948	28.2	1958	30.5	1968	19.8
1929	24.7	1939	21.0	1949	28.2	1959	30.5	1969	19.8[a]
1930	24.9	1940	22.0	1950	28.1	1960	30.2		

[a] Rate for 1969 was obtained from the Vital Statistics Section, DBS.

SOURCE: DBS, Vital Statistics 1956, Table 13;
DBS, Vital Statistics 1968, Table B.1.

childbearing. The crude birth rates are affected by the proportion of women in childbearing ages and the age-specific fertility rates. The former is called the "age factor". One way of studying the effect of age factor is to calculate a ratio of crude birth rate, b(t), to the corresponding period total fertility rate, TF(t). Ryder calls this ratio, b(t)/TF(t), the "age factor" (Ryder, 1970, pp. 2-3). The age factor, measured as explained, decreased from 7.08 (expressing the crude birth rate per 1,000 persons and the total fertility rate per woman) in 1921 to 6.97 in 1932, and then it increased to 7.86 in 1946. Since 1946 it declined steadily and reached the lowest point of 6.71 in 1965, and has since risen to 7.21 in 1969. The trends in the age factor suggest that had the observed changes in age distribution not taken place, the birth rates would have fluctuated more violently than those observed. For example, had the age factor of 1946 (the highest value) prevailed in 1960, the birth rate would have been 34.4 and not 26.8; and had the age factor of 1965 (6.71) prevailed in 1937, the birth rate would have dropped to 18.6 rather than 20.5. The current upward trend in the age factor indicates the possibility of a reversal in the downward trend of crude birth rate in the near future. The effect of the age factor on crude birth rate can also be studied by comparing the crude birth rates with the standardized birth rates with respect to age distribution. Thus, had the age distribution of 1941 prevailed in 1959 and 1969, the birth rate would have been 34.9 and not 30.5 in 1959, and 22.2 and not 19.8 in 1969. The findings of the preceding analysis indicate that part of the decline in crude birth rate since 1954 was the result of the unfavourable or negative effect of age-sex distribution. These findings coincide with those for Canada (George and Romaniuk, 1971; Henripin and Legare, 1971).

4.32 Trends in Period Fertility Rates

A more effective way of studying the trends and patterns of fertility is to examine the age-specific fertility rates and total fertility rates which are free from the effect of the variations in the proportion of women in the childbearing ages. They are, however, dependent on nuptiality, marital fertility, and illegitimate fertility. This means that the age-specific fertility rates could change simply because of an increase or decrease in the number of women getting married irrespective of their behaviour towards family size.

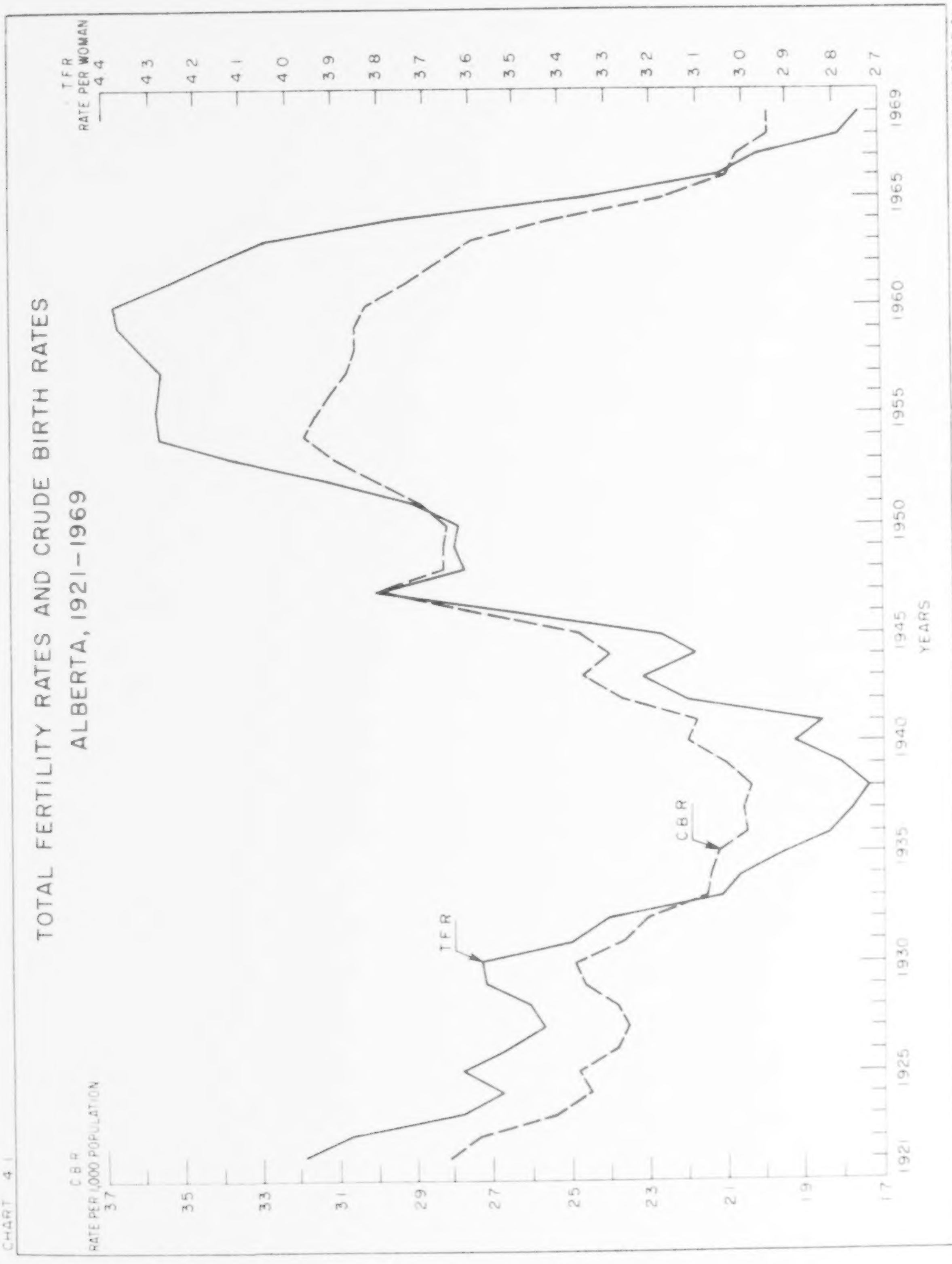
Examination of the crude birth rates, age-specific and period total fertility rates show three clear trends in fertility between 1921 and 1969: (i) a downward trend between 1921 and 1938; (ii) an upward trend between 1938 and 1960; and (iii) a steady downward trend since 1960 (Tables 4.1 and 4.2 and Chart 4.1). The data show that this drop in age-specific and period fertility decline since 1960

TABLE 4.2 -- Percent Change in Age-Specific Fertility Rates and Total Fertility Rates, Alberta: 1921-1938; 1938-1959 and 1959-1969

Age	Rate per 1,000 women				Percent Annual Average Change		
	1921	1938	1959	1969	1921-1938	1938-1959	1959-1969
15-19	48.6	29.8	84.8	58.4	-2.28	+8.79	-3.11
20-24	200.2	133.3	277.9	179.1	-1.97	+5.17	-3.56
25-29	194.9	149.4	242.2	166.1	-1.37	+2.96	-3.14
30-34	161.0	117.2	153.0	87.7	-1.60	+1.45	-4.27
35-39	121.8	80.7	86.1	43.6	-1.98	+ .32	-4.94
40-44	59.2	31.9	28.5	13.4	-2.71	- .51	-5.30
45-49	8.3	4.7	2.8	1.1	-2.55	-1.93	-6.07
Total Fertility Rate	3,970.	2,735.	4,377.	2,747.	-1.83	+2.86	-3.72

SOURCE: Same as for Table 4.1

CHART 4.1



TOTAL FERTILITY RATES AND CRUDE BIRTH RATES

ALBERTA, 1921-1969

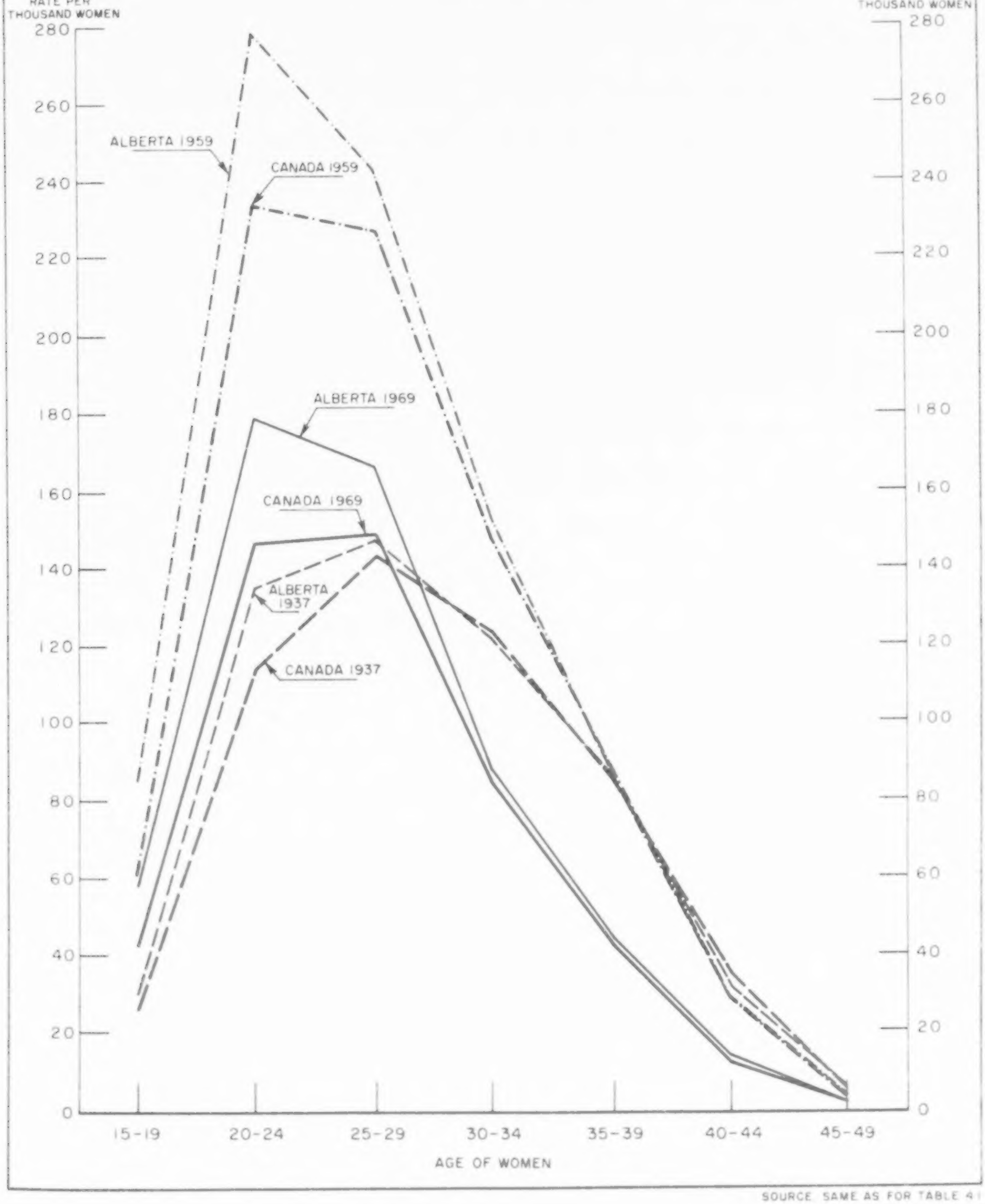
SOURCE: SAME AS FOR TABLE 4.1

was much higher than during the previous period of fertility decline since 1921. While the average annual decline of total fertility rate between 1921 and 1938 was 1.83 percent, the corresponding annual drop since 1959 was 3.66 percent from 4377 (per 1000 women) in 1959 to 2747 in 1969.

There was also a difference in the pattern of the recent decline in fertility compared with that in the 1930's (see Chart 4.2). In the latter period the rate of decline increased with the age of women. The older the women, the greater was the decline in fertility; about 47 percent of the decline in total fertility rate during this period was due to the decline in age-specific fertility rates for women over 30 years of age. In the period of fertility recovery during the post-World War period, the increase was concentrated in the younger ages, 15 to 30 years. Over 89 percent of the total increase in fertility between 1938 and 1959 was in the ages 15 to 30 years. In the recent period of fertility decline, the pattern was different from what happened between 1921 and 1938 when fertility declined. The decline was more among women in the younger ages than in the older ages. About 62 percent of the decline in total fertility rate was due to the decline in age-specific fertility rates for women under 30 years of age. Similar pattern in the variations of fertility rates was noted for Canada as well (George and Romaniuk, 1971).

CHART 4.2

AGE SPECIFIC FERTILITY RATES CANADA AND ALBERTA 1937, 1959 AND 1969



SOURCE: SAME AS FOR TABLE 4.1

4.33 The Influence of Marriage on Trends in Period Fertility Rates

As mentioned earlier, age-specific and total fertility rates depend on the proportions of women married, the age at which they marry and the duration of marriage, marital fertility and illegitimate fertility. The proportion of illegitimate births[2] to total births in Alberta has more than doubled in the sixties from 5.6 percent in 1960 to 12.0 percent in 1968, the second highest level among the provinces of Canada. This proportion depends on changes in the proportion of unmarried women and illegitimate fertility rates. The illegitimate rate depends on changes in the proportion of unmarried women and illegitimate fertility rates. However, since fluctuations in illegitimate births have relatively small effect on overall fertility, the separate effect of this factor has not been considered in the present analysis. The factors which are considered for the present analysis are changes in the proportion of women married at different ages and changes in legitimate fertility. The purpose is to know how much of the observed changes in fertility rates can be attributed to the marriage factor and how much is a reflection of genuine decline in fertility. Data on the proportions of women married and the marital fertility rates are used for the examination of the marriage factor.

The periods, 1921 - 1941, 1941 - 1961 and 1961 - 1969, respectively, correspond approximately to the three periods under consideration. The trends in the proportions of women ever married for the three periods considered (Table 4.3) indicate that: (i) the most notable increase in the proportion ever married occurred in the period 1941-1961 with the highest increase for the age groups under 30; (ii) except for the age group under age 20, the proportions of ever married decreased for all age groups in 1931-41; and (iii) the proportion of women ever married for the age groups under age 30 decreased between 1961 and 1969. The recent decrease in the proportions married under age 30 may be attributed to a number of factors such as the tendency for more young people going for higher education, difficulty for young people to find jobs, the reduction in unplanned marriages following unwanted pregnancies as a result of effective methods of birth control and the disproportion between the number of young marriageable males and females or what is known as the "marriage squeeze" (for details on marriage squeeze, see Akers, 1967).

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[2] Illegitimate births refer to "those in which parents report themselves as not having been married to each other at the time of birth or registration."

Part of the change in fertility as measured by the period fertility rates may be attributed to the changing marriage patterns and the resulting distribution of population by marital status and marriage duration. With the data available it is difficult to measure precisely the role of marriage on fertility level and pattern. However, using the data on proportions currently married among women and marital fertility rates (births per currently married women by age),

TABLE 4.3 -- Percentage of Women ever Married by Age, Alberta, 1921, 1931, 1941, 1961, 1966 and 1969

Age	Percent of women ever married					
	1921	1931	1941	1961	1966	1969
15-19	10.61	6.86	6.95	12.23	9.67	8.98
20-24	57.51	47.81	45.31	68.58	64.28	62.36
25-29	83.17	79.70	75.55	88.80	89.20	88.48
30-34	91.37	90.47	87.54	92.88	93.70	93.49
35-39	94.09	93.68	92.34	93.76	94.75	95.52
40-44	94.51	95.08	94.10	94.22	94.76	95.03
45-49	95.04	95.76	95.46	94.21	95.00	95.05
15-49	71.81	65.37	63.87	76.25	72.98	71.64

SOURCES: For 1921, 1931, 1941, 1961 and 1966, Census Volumes, and for 1969, Population Estimates by Marital Status, DBS, 1970.

an approximate estimate of the effect of change in marriage patterns can be made. Assuming that all births are legitimate, total fertility is a function of marital fertility and proportion of women currently married; by keeping one of these factors constant and varying the other factor, it is possible to estimate the effect of each separately on change in period total fertility between two points of time (for details of the procedure, see George and Romaniuk).

The results of these calculations for the three periods are shown in Table 4.4. The residual component may be explained by the effect of illegitimate fertility and the "interaction" effect (simultaneous effect of the two factors considered). The results indicate that: (i) the post-war fertility recovery was mainly due to the changes in the proportions married; and (ii) the recent decline in fertility was chiefly because of reduction in marital fertility rates. Nuptiality change accounted for only 6 percent of the total percentage change in total fertility rate between 1961 and 1969. Thus, as in Canada, most of the fertility decline in the 1960's for Alberta may be considered as a change in fertility within marriage, and a reflection of real changes in fertility levels and patterns.

4.4 Changes in the Distribution of Families by Number of Children Ever Born

The long-term decline in fertility rates in Canada and Alberta as shown by the various measures of fertility was accompanied by a substantial reduction in the proportion of

TABLE 4.4 -- Separate Contribution of Nuptiality and Age-Specific Marital Fertility Rates to Changes in Total Fertility Rates, Alberta, 1931-1941, 1941-1961, 1961-1968

Factors	1931 to 1941	1941 to 1961	1961 to 1968
Nuptiality	- 4.3	28.7	- 5.7
Marital fertility . . .	-11.5	17.7	-33.6
Residual	- 0.3	4.2	4.8
Totals	-16.1	50.6	-34.5

NOTE: The change in total fertility here refers to the percentage change in total fertility rate for the period concerned. Thus, the percentage change for the period 1931-1941, for example, will be:

$$\left(\frac{\text{TFR 1941} - \text{TFR 1931}}{\text{TFR 1931}}\right) 100$$

families with many children and a corresponding increase in the proportion with few or none. The relevant information is available only for 1941 and 1961 from the fertility data collected in the census. The percentage of ever married women with no children in Alberta declined from 14.9 in 1941 to 11.4 in 1961, i.e., 23.5 percent. The corresponding decline for Canada was 22.7 percent, from 17.6 in 1941 to 13.6 in 1961 (DBS, 1968, Table 2). During the same period between 1941 and 1961, among ever married women aged 45-54 in Alberta (all of whom had completed their families), the proportion that had borne five or more children fell from 36.4 to 20.6 percent, and the proportion with less than four children (1, 2 and 3 children) increased (see Table 4.5). These changes in the distribution of families have been accompanied by corresponding shifts in fertility rates by order of child in the family, i.e., in the number of first births, second births, etc. Rates for the higher birth orders have had the steepest downward trend in the recent years.

4.5 Fertility Differences Between Alberta and Canada

Substantial fertility differences have existed between Canada and Alberta for a long time. The various fertility measures show higher fertility level for Alberta than for Canada. In 1969, for example, while the crude birth rate and total fertility rate for Alberta were 19.8 and 2747 respectively, the corresponding rates for Canada were 17.6 and 2388.

TABLE 4.5 -- Percentage Distribution of Women ever Married Aged 45-54 Years by Number of Children ever Born, Alberta, 1941 and 1961

Distribution by number of children born	1941	1961	Percent Change (absolute)
0	9.4	10.5	1.1
1	10.8	13.5	2.7
2	16.0	23.6	7.6
3	14.8	19.2	4.4
4	12.4	12.5	0.1
5+	36.4	20.6	-15.8

SOURCE: DBS, Census of Canada, 1961, General Review, Fertility Trends in Canada, Bulletin 7.2-2, 1968, Tables 2 and 3.

In fact, Alberta had the second highest crude birth rate in 1969 among the provinces with Newfoundland occupying the first place. The total fertility rate, however, showed only fifth or sixth position for Alberta among the provinces. The higher crude birth rate for Alberta may be attributed to the favourable age-sex distribution in Alberta. The relation of fertility level between Alberta and Canada as shown by various fertility measures is shown in Table 4.6.

Between 1926 and 1969 the ratios of period total fertility rates for Alberta to Canada (rate for Alberta/rate for Canada) varied between 1.0004 in 1941 and 1.1512 in 1967 (Table 4.10) with no consistent trend. However, for the last three years, 1967-1969, the ratios are nearly 1.150, indicating the highest fertility difference ever recorded between Alberta and Canada. This may be attributed to the faster fertility decline in Canada than in Alberta in the recent years. For example, while the total fertility for Alberta declined by 36.64 percent between 1959 and 1969, the corresponding decline for Canada was 39.31 percent. Between 1964 and 1969 the rate of decline in total fertility rate for Canada was 17.8 percent higher than for Alberta during the same period.

The patterns of fertility differences between Alberta and Canada are presented in Table 4.7, which shows the ratios of age-specific fertility rates for Alberta to those for Canada. The data show that the ratios are higher

TABLE 4.6 -- Fertility Level in Alberta and Canada as Measured by Various Indices

PERIOD	RATES			
Year	Crude birth rate		Total fertility rate	
	Alberta	Canada	Alberta	Canada
1926-30	24.1	24.1	3,517	3,294
1931-35	22.1	21.6	3,133	2,941
1936-40	20.8	20.7	2,803	2,693
1941-45	23.7	23.7	3,098	2,973
1946-50	28.4	27.6	3,642	3,464
1951-55	30.6	28.0	4,066	3,705
1956-60	30.6	27.6	4,327	3,899
1961-65	26.5	24.2	3,917	3,582
1966-69	20.7	18.8	2,987	2,674

Year	Child-Woman ratios		Children ever born per 1,000 women	
	Alberta	Canada	Alberta	Canada
1901	955	691	..	..
1911	818	716	..	..
1921	784	686	..	..
1931	655	599	..	..
1941	541	502	3,219	3,341
1951	684	660	..	..
1961	811	741	2,907	2,998
1966	740	679	..	..

SOURCE: Same as for Tables 4.1 and 4.5

TABLE 4.7 -- Ratios of Age-Specific Fertility Rates for Alberta to Those of Canada

Year	Age of Women							Total Fertility Rate
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
1926	1.2793	1.2559	1.0631	.9512	.8717	.9783	1.3333	1.0503
1931	1.2040	1.1998	1.0817	.9807	.9399	.9273	.9454	1.0553
1936	1.0934	1.1641	1.0825	.9945	.9256	.9945	1.0000	1.0467
1941	1.0391	1.0853	1.0175	.9370	.9288	.9272	.9730	1.0004
1946	1.0603	1.1321	1.0684	1.0014	.8990	.9594	1.0000	1.0403
1951	1.1622	1.1685	1.0453	.9945	.9780	.9353	.9355	1.0622
1956	1.3184	1.1881	1.1054	1.0313	.9721	.9838	1.0000	1.1099
1961	1.4519	1.1918	1.0566	1.0235	1.0012	.9614	.7917	1.1112
1966	1.3485	1.1632	1.0312	1.0058	1.0156	.9948	1.0000	1.0903
1969	1.3677	1.2225	1.1178	1.0416	1.0356	1.0894	1.0000	1.1503

SOURCE: Same as for Table 4.1

for all the age groups below age 30, and that the difference in the ratios decreased with the increase in age, i.e. higher the age of women the lower the differences in the ratios. Chart 4.2 depicts the change in the pattern of period fertility in Alberta and Canada during the declining and rising phases of fertility.

4.6 Cohort Approach to Current Fertility

The advantages and the need for a cohort approach to current fertility analysis and projections have been outlined briefly in an earlier section (4.2). In the preceding analysis of fertility trends using mainly period fertility data, it has been shown that the recent fertility decline of Alberta, like in Canada, is mainly due to changes in marital fertility rates. One important question that was left unanswered in this connection is whether the variations observed in marital fertility rates reflect variations in family size (completed fertility rate in the cohort frame) or whether they are mere responses to changes in the timing of births, i.e., change in mean age at fertility due to postponement of births by recent cohorts of women. It is possible that the real situation is a combination of both a shift in the timing and a reduction in the family size. It is crucial to know the answer to this question for making reasonable assumptions on fertility projections. A cohort approach to fertility trend is required for a proper explanation of the observed variations in fertility rates in terms of both the level (family size) and the age pattern of fertility.

4.61 The Cohort Fertility Data

The required data for the calculation of cohort fertility rates for Canada and Alberta are not readily available.[3] Births for Canada and the provinces are recorded and published by age of mother at delivery, and not by date of birth of the mother. The latter information is required for calculating the cohort age-specific fertility rates. In the absence of such data, the cohort fertility rates have to be obtained by reading diagonally the period rates (former type of information) cross-classified both by age of mother and calendar year of observation. However, unlike for Canada, the provincial fertility rates for earlier years are not available by age of mother in single years, but only in five-year age groups. For the years before 1960, the single year age-specific fertility rates by cohorts were obtained by interpolating the rates for five-year age groups.[4]

It should be noted that because births are not recorded by date of birth of the mother, the calculation of cohort age-specific fertility rates from calendar year age-specific fertility rates as stated above involves certain limitations in the cohort data. This is because the period birth rate at the midpoint of year y in the x to x+1 age interval reflects the childbearing performance of not one but three adjacent cohorts: y-x-1, y-x and y-x+1. According to the estimates made by Romaniuk for Canada, assuming a uniform distribution of births through time, the middle cohort contributes 74.3 percent, the adjacent younger one 17.0 percent, and the adjacent older one 8.7 percent, to the calendar year births of a given age interval[5] (Romaniuk, 1970, p. 9). No adjustments for these differences have been done in converting the period rates into cohort rates. However, as the number of births and the distribution of births within the year do not abruptly change from one calendar year to the next, it is likely that the limitation in converting the period rates to cohort rates will not seriously affect the reliability of the cohort fertility rates derived here.

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[3] For Canada, cohort fertility rates have been prepared by A. Romaniuk (Romaniuk, 1970).

[4] The interpolation of five-year rates into single year rates was done by Prof. Jacques Henripin of the University of Montreal. We are grateful to Dr. A. Romaniuk, Chief, Population Estimates and Projections Section of the Statistics Canada for making these data available to us for this study.

A cohort approach to the analysis of fertility variations in terms of the level and age pattern of fertility, and a comparison of the period and cohort fertility rates, required the calculation of a series of cohort completed fertility rates for as many cohorts as relevant to the period fertility rates. In order to obtain the relevant cohort series, completed fertility rates had to be projected for those cohorts of women who had not completed their fertility. The procedures used in projecting the completed fertility rates are discussed in the next section (4.7).

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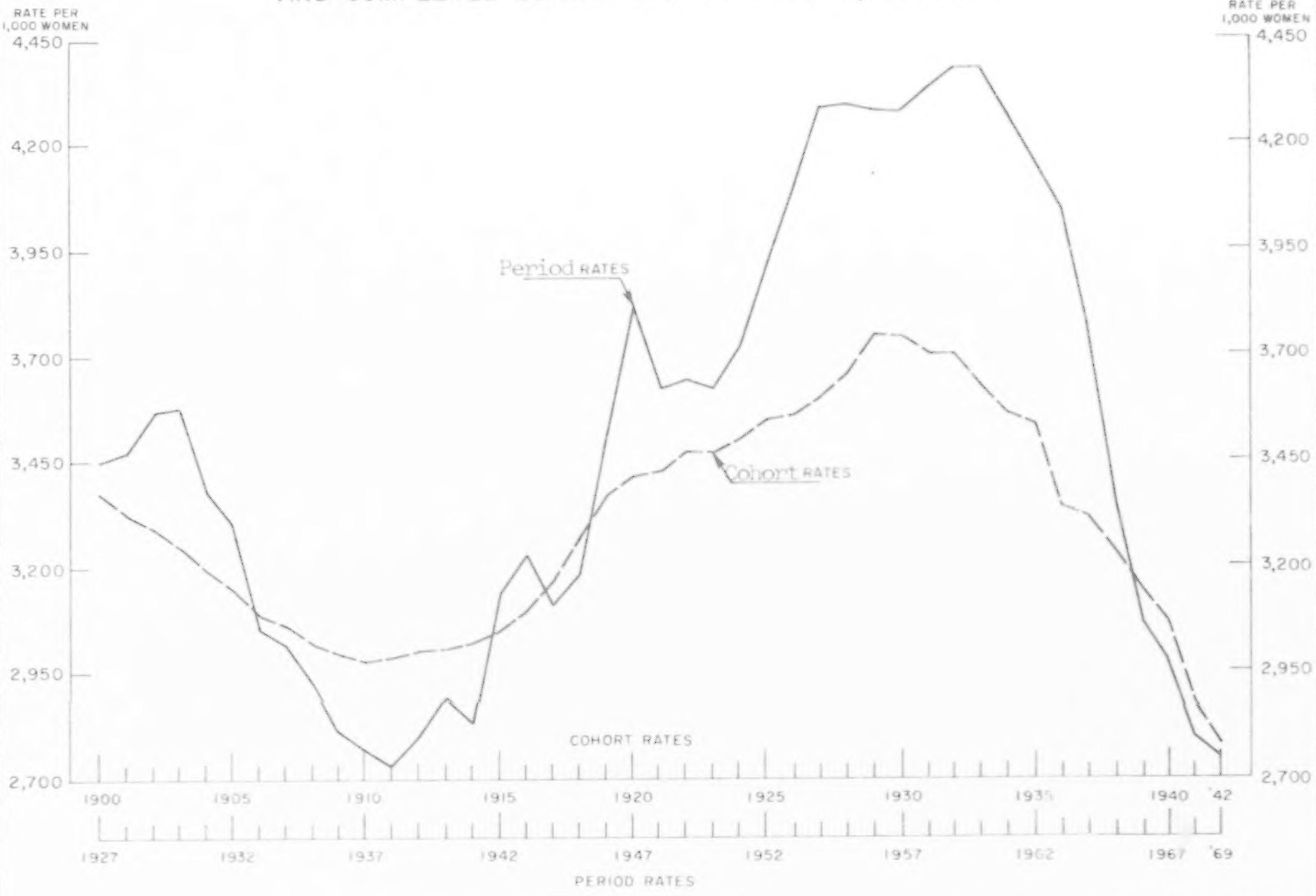
[5] The percentage breakdown as observed is because of the fact that the birth rate in Canada is calculated as of June 1 and not of midyear (July 1).

A comparison of total period fertility rates with completed cohort fertility rates is depicted in Chart 4.3. To make this comparison possible, the rates are plotted with a time lag of 27 years, between period rates and cohort rates, that is, the rate for the actual cohort of 1900 is plotted on the same vertical line as the rate for the hypothetical cohort of 1927. A 27-year lag was chosen because the median age of childbearing varied between 26.1 and 28.3 during 1900 to 1930.

Considerable differences can be seen between the amplitude of the variation of the cohort rate and that of the period rate. Two main points may be noted from the comparison of the two curves: (i) from 1947 to 1963, the period total fertility rates are substantially higher than the completed cohort fertility rates; and (ii) since 1966 the period rates are below the cohort rates. For the entire period considered, while the cohort completed fertility rates rose from 2.97 for the 1910-11 cohort to a high of 3.74 for the 1929-30 cohort and then declined to 2.78 for 1942-43 cohort (estimated rate), the period total

CHART 43

PERIOD TOTAL FERTILITY RATES AND COMPLETED COHORT FERTILITY RATES, ALBERTA



SOURCE TABLES 4.8 AND 4.10

fertility rates varied between 2.73 in 1938 to 4.38 in 1960 and to 2.75 in 1969. The gain involved in the rising phase of the fertility curve was 0.77 and 1.65 and the loss in the declining phase of the curve was 0.96 and 1.63 births for cohort and period rates, respectively. From these figures the impact of family size on period total fertility can be estimated at about 46.7 percent (0.77 / 1.65) for the rising phase and at 58.9 percent (0.96 / 1.63) for the declining phase of the cycle of fertility. The remaining 53.3 percent and 41.1 percent give the extent of the contribution by the age pattern of fertility for the rising and declining phases of fertility, respectively. Another notable thing which may be expected from the nature of rates is that the year-to-year fluctuations have been much smaller for the actual than for the hypothetical cohorts. This and the aforesaid findings indicate that changes in the timing of births (postponement) have a relatively smaller impact on the final rates by actual cohorts, i.e., completed fertility rates, but a major impact on those by hypothetical cohorts, i.e., total fertility rates (Whelpton and Campbell, 1960, p. 20). The comparison between the two rates also reveal that the earlier (in 1930's) and later declines in fertility rates were more rapid for the hypothetical as shown by the period rates than for the actual cohorts. This probably reflects in large measure the influence of changes in the timing pattern. This means that birth intervals between successive births are widening drastically in the recent phase of fertility decline with a tendency for women of these cohorts to have children at slightly higher ages than their immediate predecessors.

It may be concluded from the analysis based on cohort fertility data that the drastic decline in period fertility rates in the 1960's is due to the effect of changes in both family size and age pattern of childbearing. Our rough estimate is that change in the age pattern of childbearing contributed to about 40 percent of the decline in period total fertility rate in the sixties.

4.62 Projection of Completed Cohort Fertility Rates

For those cohorts with completed or nearly completed fertility, the estimation of completed fertility rates is relatively easy. Difficulties are encountered for those cohorts of women born in the forties, who are still in their twenties and who still have a long way to go before their family size and age pattern of fertility are known. Women who will be in the childbearing ages during the projection period, 1970-1985 belong to the cohorts born between 1920-21 and 1969-70. In 1970, at the beginning of the projection period, these women range in age from zero to 49 years. The youngest of these have a long time to wait before entering childbearing while the older ones are at different stages of reproductive process. Hence, different treatments are required to estimate the completed fertility rates of all these cohorts. For the cohorts 1920-21 to 1930-31 who were at least 38 years old in 1969, completed fertility rates had already been extrapolated by Henripin. These were accepted as reliable for the purpose. The projections of completed fertility rates for other cohorts were done by grouping them into three, taking into consideration the various stages of their family building process. These were:

1. Women born between 1931-32 and 1942-43 who were at least 26 years old in 1969, and have almost passed the peak of reproduction.
2. Women born between 1943-44 and 1953-54 who are 15 to 26 years old in 1969.
3. Women born between 1954-55 and 1969-70 who have just entered or will enter childbearing only during the projection period.

Different procedures were used for the projection of cohort fertility rates for the three groups of cohorts, taking into consideration their cumulative fertility up to age x ($x < 50$ years) and other relevant considerations. It should be noted that as in the case of other socio-demographic phenomena, there is no foolproof method for projecting fertility, whether the cohort or period approach is adopted. A number of ways can be used to project the completed fertility rate for the cohorts bearing children during the projection period. These include extrapolation of past trends making use of the past experience, fitting of the completed fertility to a theoretical curve such as the Grompertz function, and use of information about expected family size based on surveys or other sources. The experiments so far carried out by various researchers do not suggest one method superior to another. For example, in the recent population projections for Canada, three methods, viz., Grompertz function, chain ratio method and graphical extrapolation were tried to project completed fertility rates. After evaluating the results, it was decided to select the fertility rates derived by the chain ratio method for the projection purpose (Romaniuk, 1970, pp. 10-16). In the present case, it was felt unnecessary to repeat these methodological experiments on Alberta data. Hence, most of the methods used here are those already tested on Canadian and U.S. data in other studies (Romaniuk, 1970; Ryder, 1971; Siegel, Zitter and Akers, 1964). Besides, the experience and results in the fertility projections for Canada were an additional help in the present study because of their special relevance to Alberta. Thus, the decisions on the procedures used here are based on our judgment taking into consideration the experience in the projections for Canada and in other studies and the data available for Alberta.

4.621 Cohorts Born Between 1931 and 1943

The projection of completed fertility rates for these cohorts were done by using a method suggested by

Ryder (1971) which makes use of the information on the cumulative fertility level and pattern (up through age x) of the preceding cohort and the cohort under consideration. The procedure as described by Ryder is as follows:

> Suppose two cohorts have identical age distributions of their total fertility, except that the distribution for the more recent cohort is shifted, in toto, d years to the left (younger). Assume that d lies between 0 and 1 year. Then $A'(x+d) = A''(x)+d$, where $A(x)$ is the mean age of cohort fertility for experience up through age x, and the earlier and later cohort calculations are identified by single and double primes respectively. Furthermore, simple linear interpolation permits the following estimate: $A'(x+d) = (1-d)A'(x)+(d)A'(x+1)$. From these two equations for $A'(x+d)$ we can solve for d. Thus,

$$d = \frac{A'(x)-A''(x)}{1-(A'(x+1)-A'(x))}$$

Since $A''(w-d) = A'(w)-d$, where w is the highest age of fertility, we can estimate the mean age of fertility for the later cohort (for which data may be available only up through age x) from the mean age of fertility for the earlier cohort (chosen because it has completed its childbearing), using the formula for d.

Similarly, we have $\frac{F''(w-d)}{F'(w)} = \frac{F''(x)}{F'(x+d)}$ where $F(x)$ is the total fertility rate for experience up through age x. Again, by interpolation we have $F'(x+d) = (1-d)F'(x)+(d)$

F'(x+1). Thus, given d, we can estimate F"(w-d), the complete total fertility rate for the later cohort (for which we only have information through age x).

The application of the above method to the cohorts 1931-32 to 1942-43 yielded estimates of completed fertility rates for these cohorts (see Table 4.8). The difference between the estimated completed fertility rates and the cumulative fertility rates up through age x for each cohort were then distributed among the relevant ages on the basis of the corresponding age pattern of each preceding cohort.

The main assumption implicit in the application of this procedure is that "eventual distributional differences can be inferred from distributional differences up to the intermediate age." The application of this procedure was found not to be satisfactory for cohorts of women who were less than 26 years of age in 1969.

4.622 Cohorts Born Between 1943 and 1954

Dependence on the level and pattern of cumulative fertility rates up through age x (incomplete fertility data) is the main feature of the procedures followed so far for projecting fertility rates. This is not quite practicable for cohorts which are due to enter childbearing later on during the projection period, and those who have not reached the peak age of childbearing.[6] Hence, the

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[6] The median age at maternity which is estimated as approximately 27 years for Alberta was the main guideline to know the peak age of childbearing.

ABLE 4.8 -- Actual and Projected Completed Cohort Fertility Rates for Alberta and Canada, 1900-01 to 1969-70
(Number of children born or expected to be born per 1,000 women aged 49 years)

Birth year of women (June 1 to May 31)	Age in 1970	Age in 1985	RATE FOR ALBERTA		RATE FOR CANADA		$\frac{(a)}{(b)}$ x 100	$\frac{(a)}{(c)}$ x 100
			(a)		(b)			
ctual								
1900-01	69	84	3,375.0		..		..	..
1901-02	68	83	3,325.0		..		..	..
1902-03	67	82	3,288.0		..		..	..
1903-04	66	81	3,246.5		..		..	..
1904-05	65	80	3,197.0		..		..	..
1905-06	64	79	3,155.0		2,879.0		109.6	..
1906-07	63	78	3,091.0		2,841.0		108.8	..
1907-08	62	77	3,059.0		2,832.0		108.0	..
1908-09	61	76	3,016.0		2,736.0		110.2	..
1909-10	60	75	2,991.0		2,762.0		108.3	..
1910-11	59	74	2,971.0		2,711.0		109.6	..
1911-12	58	73	2,982.0		2,720.0		109.6	..
1912-13	57	72	2,994.3		2,767.0		108.2	..
1913-14	56	71	3,002.0		2,873.0		104.5	..
1914-15	55	70	3,017.7		2,813.0		107.3	..
1915-16	54	69	3,042.2		2,885.0		105.4	..
1916-17	53	68	3,091.7		2,879.0		107.4	..
1917-18	52	67	3,169.4		2,929.0		108.2	..
1918-19	51	66	3,267.7		2,893.0		113.0	..
1919-20	50	65	3,367.2		3,231.0		104.2	..
rojected								
1920-21	49	64	3,416.5		3,267.0		104.6	..
1921-22	48	63	3,426.4		3,286.0		104.3	..
1922-23	47	62	3,464.6		3,220.0		107.6	..
1923-24	46	61	3,467.8		3,258.0		106.4	..
1924-25	45	60	3,497.1		3,289.0		106.3	..
1925-26	44	59	3,538.1		3,272.0		108.1	..
1926-27	43	58	3,557.0		3,254.0		109.3	..
1927-28	42	57	3,596.8		3,303.0		108.9	..
1928-29	41	56	3,650.6		3,287.0		111.1	..
1929-30	40	55	3,742.9		3,423.0		109.3	..
1930-31	39	54	3,733.9		3,417.0		109.3	..
1931-32	38	53	3,702.2		3,414.0		108.4	..
1932-33	37	52	3,699.6		3,327.0		111.2	..
1933-34	36	51	3,627.8		3,232.0		112.2	..
1934-35	35	50	3,559.6		3,213.0		110.8	..
1935-36	34	49	3,531.5		3,185.0		110.9	..
1936-37	33	48	3,337.6		3,067.0		108.8	..
1937-38	32	47	3,318.9		3,058.0		108.5	..
1938-39	31	46	3,230.3		2,995.0		107.9	..
					Low Assumption (b)	High Assumption (c)		
1939-40	30	45	3,140.5		2,853.0	2,896.0	110.1	108.4
1940-41	29	44	3,067.3		2,757.0	2,788.0	112.2	110.0
1941-42	28	43	2,885.7		2,644.0	2,699.0	109.1	106.9
1942-43	27	42	2,779.2		2,567.0	2,614.0	108.3	106.3
			Assumption	Assumption	Low Assumption (c)	High Assumption (d)	$\frac{(a)}{(c)}$ x 100	$\frac{(b)}{(d)}$ x 100
1943-44	26	41	2,695.1	2,718.1	2,452.0	2,522.0	109.9	107.8
1944-45	25	40	2,617.8	2,630.0	2,382.0	2,431.0	109.9	108.2
1945-46	24	39	2,572.9	2,592.8	2,341.0	2,361.0	109.9	109.8
1946-47	23	38	2,561.0	2,584.7	2,330.0	2,354.0	109.9	109.8
1947-48	22	37	2,539.2	2,587.1	2,310.0	2,357.0	109.9	109.8
1948-49	21	36	2,497.3	2,590.0	2,272.0	2,378.0	109.9	108.9
1949-50	20	35	2,484.1	2,596.4	2,260.0	2,385.0	109.9	108.9
1950-51	19	34	2,468.3	2,597.0	2,246.0	2,384.0	109.9	108.9
1951-52	18	33	2,457.8	2,651.6	2,236.0	2,460.0	109.9	107.8
1952-53	17	32	2,447.6	2,682.0	2,227.0	2,488.0	109.9	107.8
1953-54	16	31	2,439.6	2,720.0	2,219.0	2,523.0	109.9	107.8
1954-55	15	30	2,426.6	2,777.1	2,212.0	2,569.0	109.7	108.1
1955-56	14	29	2,415.6	2,872.6	2,208.0	2,650.0	109.4	108.4
1956-57	13	28	2,406.7	2,951.2	2,206.0	2,715.0	109.1	108.7
1957-58	12	27	2,399.0	3,019.3	2,205.0	2,770.0	108.8	109.0
1958-59	11	26	2,387.0	3,071.3	2,200.0	2,810.0	108.5	109.3
1959-60	10	25	2,380.4	3,117.0	2,200.0	2,844.0	108.2	109.6
1960-61	9	24	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1961-62	8	23	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1962-63	7	22	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1963-64	6	21	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1964-65	5	20	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1965-66	4	19	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1966-67	3	18	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1967-68	2	17	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1968-69	1	16	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0
1969-70	0	15	2,365.0	3,135.0	2,190.0	2,850.0	108.0	110.0

SOURCE: Obtained as described in Sections 4.61 and 4.62.

projections of cohorts in this group, or those between 15 to 26 years of age were carried out in two stages, combining the information that is already available for the truncated cohorts up to age 26 and the results based on recent fertility projections for Canada by the cohort method. It should be noted that apart from using the past trends in cohort fertility rates, data on parity distribution, nuptiality and childspacing were used in projecting the fertility rates for Canada. Such data are not readily available for Alberta. The projected fertility rates for Canada were, therefore, used as the base for projecting the Alberta rates for the cohorts of women who have little experience in childbearing or will enter the reproductive years during the projection period.

Cohorts considered here fall into the ages of 15 to 26 years old in 1969, and information on their fertility performance is available in varying degree for the different cohorts; fertility up to age 26 for 1943-44 cohort and up to age 15 for 1953-54 cohort. These cohorts exhibit a substantial drop in fertility for most of the ages (15-26). For example, the cumulative fertility rate up to age 26 for the 1943-44 cohort was 16.2 percent lower than the corresponding rate for the 1939-40 cohort. As noted earlier, the observed decline in fertility may be attributed to a shift in family size norms or in the timing of childbearing (shift in the timings of births from younger to older ages) or a combination of both. A similar decline in fertility has occurred for Canada, and the recent fertility projections for Canada have accounted for the possibility of change both in family size norms and in the age pattern of fertility. Considering these factors and for the purpose of utilizing the available information on cumulative fertility rates up to age x (i.e., age 15 to 26), the projections of cumulative fertility rates for these cohorts were done in two stages.

In the first stage, cumulative fertility rates up to age 26 were extrapolated for all the truncated cohorts using a chain ratio method on the assumption that the ratios of fertility rates will remain stable for the cohorts considered. Thus, if f_x^y and $f^y_{(x+1)}$ are the cumulative fertility rates up to ages x and x+1, respectively, for the cohort y, and $f_x^{(y+1)}$ and $f_{(x+1)}^{(y+1)}$ are the corresponding rates for the next youngest cohort, y+1, then given f_x^y, $f^y_{(x+1)}$, and $f_x^{(y+1)}$,

$$f_{(x+1)}^{(y+1)} \quad \frac{f^{y}_{(x+1)}}{f_x^{y}} \cdot f_x^{(y+1)}$$

The procedure, when repeated for each truncated cohort and successive ages yielded the cumulative fertility rates up to age 26.[7] As noted earlier in the discussion of fertility trends, the recent decline in fertility was concentrated in the young ages. Hence, it was considered rational to make the projection using the available information on trends and patterns of fertility among the cohorts 1943/44 to 1953/54 up to age 26.

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[7] Chain ratio method as applied here was used for projecting cumulative cohort fertility rates for Canada for the cohorts 1920-21 to 1938-39 (Romaniuk, 1970, p. 11).

In the second stage, cumulative fertility rates for the remaining ages 27 to 49 were projected using a ratio method taking into account the relationship between cumulative fertility rates for Alberta and Canada. The ratio method is widely used for sub-national population projections. It is used in situations where a well-founded projection for the country as a whole is on hand. The availability of such a projection for Canada and the lack of required data to prepare an independent fertility projection for Alberta for the cohorts born after 1943 prompted the use of the ratio method. The method has the advantage that it is flexible, unlike mathematical models, and the ratios are projected on the basis of considerations of past and future trends, implicitly taking into account the relation of demographic, social and economic forces of the province to that of the country. For ages 27 to 49, two sets of average age-specific ratios for the cohorts 1940-41, 1941-42 and 1942-43 were calculated by dividing the cumulative age-specific fertility rates for Alberta by the corresponding projected rates for Canada under low and high assumptions. These average age-specific ratios were then multiplied by the corresponding projected rates for Canada, 1943-44 to 1953-54 under low and high assumptions and the projected rates (low and high projections) for Alberta were obtained (see Table 4.8).

4.623 Cohorts Born After 1954

Projection of fertility rates for the cohorts which are due to enter childbearing during the projection period is the most hazardous task. This is because there is no partial information on the fertility performance of the cohorts for which the complete fertility rate is to be estimated. Two procedures are open here. One is to extrapolate the rates on the basis of the time series of completed fertility rates, and the other is to make use of the experience in the fertility projections for Canada, and the relationship between the fertility rates for Canada and Alberta. The latter procedure was adopted here.

There were two steps involved in the procedure. The first was to project the completed fertility rates. In doing this, one main guideline was the trends and levels of the completed fertility rates for Alberta and Canada (see Table 4.8). The analysis of past trends in fertility (Section 4.61) has revealed a considerable reduction in the family size concomitant with a tendency for younger women to have children at slightly higher ages than their immediate predecessors. It was also noted that the shift in family size was the dominant cause for the decline in fertility. In making assumptions on future fertility level of the cohorts born after 1954, the question is whether future decline in fertility level in the short run will be achieved by an actual decline in completed fertility rate or by a shift in the timing of births from younger to older ages with widening birth intervals which will have no marked effect on completed fertility rate. The recent decline in fertility in Alberta and Canada seems to be indicative of a process that will end in smaller family size, equivalent to a fertility level close to replacement level. With increasing urbanization, education and labour force participation of women coupled with the access to more efficient contraception methods and improved communication about modes of family planning, the process towards smaller family size is likely to be accentuated. As Ryder has rightly pointed out, the tendency is now to regard the large family as beginning with the third rather than with the fifth child (Ryder, 1970, p. 34). Furthermore, procreative behaviour appears to be increasingly a rational decision by couples based on the assessment of the personal and other circumstances. Although data on family size expectations of women are not available for Canada, the data available for American women from the sample surveys conducted for the United States between 1955 and 1965 do not show any significant variations in family size at an aggregate level (Ryder, 1967). On the basis of these considerations, it was assumed that the ratio of completed fertility rate for Alberta to Canada will decrease linearally between 1952-53 to 1960-61 from 1.099 to 1.080 under the low assumption, and will increase from 1.078 to 1.100 under the high assumption. It should be noted that during the first phase of fertility decline in Alberta, 1900-01 to 1912-13, the ratios of total fertility rates for Alberta to Canada varied between 1.080 to 1.102. The projected ratios were multiplied by the corresponding completed fertility rates for Canada and obtained the projected completed fertility rates for Alberta. The calculation yielded a family size of 2.365 children as the possible low fertility and 2.850 children as the possible high fertility of the 1960-61 cohort (see Table 4.8).

The second step was to distribute the projected completed fertility rates by age of women within the reproductive span for obtaining the age-specific fertility rates by cohort. For the earlier cohorts (before 1954) the age pattern was projected first and then the completed fertility rates were derived. A reverse process is required in the present case with assumptions on the future changes in the age pattern of fertility. Changes in age pattern of fertility have a direct impact on the variations in the number of annual births (Ryder, 1969). As in Canada, the available data for Alberta indicate a tendency for women to have children at progressively younger ages. The median age of fertility or maternity for Alberta has decreased from 28.3 for the 1916-17 cohort to 24.0 for the 1937-38 cohort. During the same period the median age of fertility for Canada has dropped from 28.53 to 24.80 (Romaniuk, 1970,

p. 32). In the same period the proportion of children born to these cohorts before reaching age 25 to all children born has increased from 27 to 54 percent, and 26 to 46 percent for Alberta and Canada, respectively. The data indicate that the change to a younger age pattern of fertility is faster in Alberta than in Canada.

An appropriate procedure for projecting the age pattern of future fertility is to extrapolate the past trends taking into account (i) the prospective changes in nuptiality, (ii) the spacing of births and parity distribution by age of mother. All the data required for projection of age pattern of fertility for Alberta are not available. In the circumstance, two options were considered. One was to select suitable age distributions that would represent varying fertility pattern from distributions for Alberta in the past, and assume for the future. The second was to select suitable age patterns from the projected age patterns of fertility for Canada which had taken into account the factors mentioned above (Romaniuk, 1970, Section 4). The latter option was preferred here. Fairly close similarities were observed in the age pattern of fertility between Alberta and Canada in the past. However, the trends in the age distribution for Canada and Alberta, as observed earlier, indicated a tendency for women to have children at progressively younger ages, but the change was faster for the latter than for the former (see Table 4.9). Further reduction in completed fertility

TABLE 4.9 -- Percentage Distribution of Completed Fertility Rate by Age for Selected Cohorts, 1921-22 and 1931-32, Alberta and Canada

Age	Alberta		Canada	
	1921-22	1931-32	1921-22	1931-32
14-19	4.4	7.9	4.7	6.6
20-24	24.4	35.4	23.4	31.4
25-29	31.0	32.1	31.0	32.8
30-34	23.3	17.2	23.6	19.2
35-39	13.0	6.0	13.3	7.4
40-44	3.7	1.3	3.8	2.4
45-49	0.2	0.1	0.2	0.2
Totals	100.0	100.0	100.0	100.0

SOURCE: Cohort fertility data derived as explained in Section 4.61 of the text.

rate, as assumed earlier, for the future is likely to be achieved by early maternity and small family size. At the same time it may be argued that the median age at maternity for Alberta women is already quite low (24.0 years for the cohort 1937-38) and further reduction would be hard to achieve. The reduction in the proportion married under age 30 between 1961 and 1969 observed in Section 4.33 can be stated in support of this argument. However, as in the case of Canada, a negative association between fertility level and its age pattern was assumed here. On the basis of this assumption two of the three assumptions on age pattern for Canada were selected and used for Alberta: (i) the very young age pattern (A) for the high fertility assumption; and (ii) the old age pattern (C) for the low fertility assumption (see Romaniuk, 1970, Table 9).[8] It is expected that these two patterns will reflect the range in the future age pattern of fertility for Alberta. By multiplying the assumed completed fertility rates by the corresponding assumed percentage distribution of fertility by age, age-specific cohort fertility rates were obtained.

Women born between 1961 and 1970 will begin reproduction only in the later part of the projection period. They will vary in their ages between 15 and 24 in 1985. It was assumed that the cohorts born after 1961 would have the same fertility level and pattern as the cohort of 1960-61. The assumed completed fertility rates and age pattern represent the maximum expected range in the ultimate family size and the age pattern of fertility. In view of the fact that we do not have any information on the fertility behaviour of these cohorts, it is safe to assume that their behaviour will be similar to those cohorts of women immediately preceding them. At any rate, any possible deviation from the expected fertility performance of these cohorts will have only negligible effect on the period fertility rates during the projection period.

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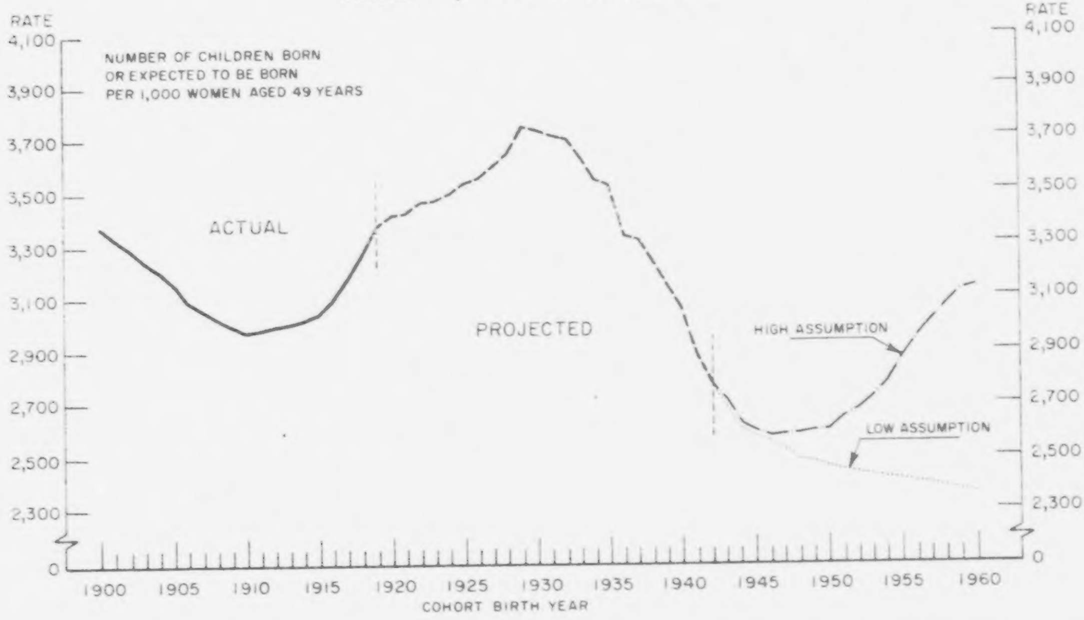
[8] Table 9 of Romaniuk's study gives only five-year age distribution of fertility. However, single year age distributions were available in unpublished form which were used in the present study.

4.624 Conversion of Cohort Fertility Rates to Period Rates

The actual and projected completed cohort fertility rates for Alberta and Canada are presented in Table 4.8 and charted in Chart 4.4. In a few cases, the age-specific cohort fertility rates as derived by the procedures adopted for different groups of cohorts did not show internal consistency between various ages of the projected fertility rates or between projected and actual fertility rates. This may be expected in view of the various stages involved in projecting the age-specific cohort fertility rates. It may be noted that the total fertility rate for a given year is obtained by summation of the age-specific fertility rates of 35 annual cohorts which have contributed births to that year. A free-hand correction was made in such cases

CHART 4.4

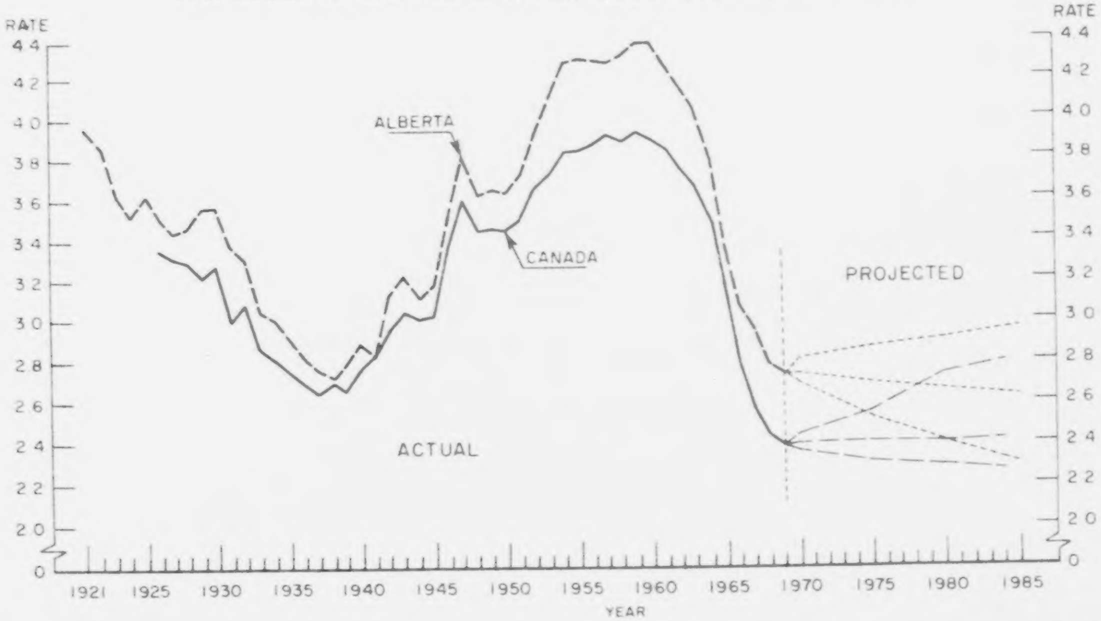
ACTUAL AND PROJECTED COHORT FERTILITY RATES BY COHORT, ALBERTA, 1900/01 TO 1960/61



SOURCE: TABLE 4.8

CHART 4.5

ACTUAL AND PROJECTED TOTAL FERTILITY RATES BY CALENDAR YEAR FOR ALBERTA AND CANADA, PER 1,000 WOMEN, 1921-1985



SOURCE: TABLE 4.10

to ensure as much smooth transition as possible from actual to projected values.

The age-specific cohort fertility rates under the two assumptions were then rearranged diagonally in two separate tables covering the projection period 1970-1985. The vertical values of these tables were then taken as the projected period fertility rates for each year ending May 31. The age-specific period fertility rates showed some unacceptable jumps or dips in the time series and the beginning of the projected ones. As it is generally done or recommended in such cases, some adjustments of the rates were finally done in order to achieve a more satisfactory juncture of projected rates with the historical series (see Siegel, Zitter and Akers, 1964, p. 18; Stone, 1971, Appendix B). The main guideline for these adjustments was the age pattern of period fertility rates for the three years before the beginning of the projection period, 1967, 1968 and 1969 (see Table 4.11).

Period total fertility rates for the successive calendar years, 1921 to 1985, for Alberta and Canada are presented in Table 4.10 and portrayed in Chart 4.5. The projection yielded period total fertility rates of 2,303 and 2,969 for 1985 under the low and high assumptions, respectively.

The period fertility rates under the medium assumption were obtained by averaging the total fertility rates under low and high assumptions. The age-specific rates

TABLE 4.10 -- Actual and Projected Total Fertility Rates by Calendar Year for Alberta and Canada, per 1,000 Women, 1921-1985

ACTUAL

Year	Alberta (a)	Canada (b)	$\frac{(a)}{(b)}$ x100	Year	Alberta (a)	Canada (b)	$\frac{(a)}{(b)}$ x100	Year	Alberta (a)	Canada (b)	$\frac{(a)}{(b)}$ x100
1921	3,970	..	..	1938	2,735	2,701	101.3	1955	4,286	3,831	111.9
1922	3,875	..	..	1939	2,796	2,654	105.4	1956	4,282	3,858	111.0
1923	3,627	..	..	1940	2,889	2,766	104.4	1957	4,278	3,925	109.0
1924	3,531	..	..	1941	2,833	2,832	100.0	1958	4,321	3,880	111.4
1925	3,621	..	..	1942	3,134	2,964	105.7	1959	4,377	3,935	111.2
1926	3,526	3,357	105.0	1943	3,224	3,041	106.0	1960	4,378	3,895	112.4
1927	3,448	3,319	103.9	1944	3,117	3,010	103.6	1961	4,267	3,840	111.1
1928	3,469	3,294	105.3	1945	3,184	3,018	105.5	1962	4,159	3,756	110.7
1929	3,568	3,217	110.9	1946	3,510	3,374	104.0	1963	4,042	3,669	110.2
1930	3,574	3,282	108.9	1947	3,811	3,595	106.0	1964	3,765	3,502	107.5
1931	3,377	3,200	105.5	1948	3,621	3,441	105.2	1965	3,351	3,145	106.6
1932	3,302	3,084	107.1	1949	3,640	3,456	105.3	1966	3,066	2,812	109.0
1933	3,051	2,864	106.5	1950	3,629	3,455	105.0	1967	2,977	2,586	115.1
1934	3,014	2,803	107.5	1951	3,721	3,503	106.2	1968	2,795	2,441	114.5
1935	2,923	2,755	106.1	1952	3,923	3,641	107.7	1969	2,747	2,388	115.0
1936	2,822	2,696	104.7	1953	4,116	3,721	110.6				
1937	2,773	2,646	104.8	1954	4,283	3,828	111.9				

PROJECTED

Year	Alberta			Canada					
	Low Assumption (a)	Medium Assumption (b)	High Assumption (c)	Low Assumption (d)	Medium Assumption (e)	High Assumption (f)	$\frac{(a)}{(d)}$ x100	$\frac{(b)}{(e)}$ x100	$\frac{(c)}{(f)}$ x100
1970	2,683	2,751	2,811	2,363	2,404	2,456	113.5	114.4	114.5
1975	2,529	2,695	2,860	2,312	2,419	2,651	109.4	111.4	107.9
1980	2,415	2,665	2,913	2,284	2,418	2,738	105.7	110.2	106.4
1985	2,303	2,636	2,969	2,267[a]	2,424[a]	2,823[a]	101.6	108.7	105.2

[a] 1984 rate

TABLE 4.11 -- Percentage Distribution of Average Age-Specific Fertility Rates, 1967, 1968 and 1969, Alberta.

Age	Percentage Distribution	Age	Percentage Distribution
15.5	0.25	35.5	2.25
16.5	0.78	36.5	1.87
17.5	1.80	37.5	1.64
18.5	3.31	38.5	1.44
19.5	4.80	39.5	1.13
15-19	10.94	35-39	8.33
20.5	5.94	40.5	0.83
21.5	6.54	41.5	0.64
22.5	6.73	42.5	0.49
23.5	6.98	43.5	0.38
24.5	7.08	44.5	0.22
20-24	33.27	40-44	2.56
25.5	6.80	45.5	0.13
26.5	6.46	46.5	0.06
27.5	5.65	47.5	0.03
28.5	5.21	48.5	0.01
29.5	4.53	49.5	0.00
25-29	28.65	45-49	0.23
30.5	4.05		
31.5	3.54		
32.5	3.10	Total Percentage Distribution	100.00
33.5	2.78		
34.5	2.55		
30-34	16.02		

SOURCE: Obtained from unpublished data, DBS, Vital Statistics Section under the medium assumption were obtained by applying the average age distribution of period fertility rates, 1967, 1968 and 1969 (Table 4.11) to the projected total fertility rates. For the medium fertility rate the same age distribution was assumed for the entire projection period, which represents the most recent age distribution of period fertility rates. The projected age-specific fertility rates under the three assumptions are presented in Table 4.12.

4.7 Projection of Annual Births

The annual age-specific fertility rates for each calendar year were finally multiplied by the female survivors for the corresponding ages and obtained the projected annual number of births. The sex distribution of the births for each year was obtained by applying the sex ratio of 1,053.2 male births per 1,000 female births. The sex ratio used is the average sex ratio at birth for the years 1959 to 1968.

4.8 Concluding Remarks

This chapter has two parts. In the first part a brief analysis of fertility in Alberta is carried out, using both period and cohort fertility data. The second part deals with the projections of fertility based on cohort approach. The results of the fertility analysis served as a mirror on the past and provided the background information for making the various assumptions on future fertility level and pattern.

TABLE 4.12 -- Projected Age-Specific Fertility Rates, 1970, 1975, 1980 and 1985 for Alberta
(per 1000 women)

Age	Low Assumption				Medium Assumption				High Assumption			
	1970	1975	1980	1985	1970	1975	1980	1985	1970	1975	1980	1985
15	6.5	6.0	5.8	5.8	6.8	6.6	6.6	6.5	7.0	7.1	7.2	7.6
16	19.1	14.9	13.6	12.5	21.5	21.1	20.9	20.6	23.0	24.3	26.4	27.2
17	45.5	37.8	32.1	31.1	49.5	48.5	48.0	47.5	51.8	52.4	54.2	56.9
18	80.6	71.6	64.0	63.0	91.0	89.2	88.2	87.3	90.5	90.9	91.2	92.0
19	130.4	125.7	117.8	110.7	132.0	129.3	127.9	126.5	140.5	143.8	145.8	147.6
20	146.0	140.7	132.0	130.2	163.5	160.2	158.4	156.7	152.6	154.5	158.2	161.3
21	183.1	178.0	165.9	159.9	179.9	176.3	174.3	172.4	190.3	192.8	195.4	200.4
22	190.0	191.2	180.7	172.0	185.1	181.4	179.4	177.4	200.0	204.5	208.1	212.2
23	195.7	194.8	183.6	182.4	191.9	188.0	185.9	183.9	210.2	212.4	215.0	218.5
24	198.8	196.2	190.8	189.7	194.8	190.8	188.7	186.7	212.0	220.8	224.2	230.2
25	194.9	190.5	184.0	182.6	187.0	183.3	181.2	179.3	196.6	200.7	204.6	210.3
26	185.2	183.2	178.5	176.2	177.7	174.1	172.1	170.3	186.5	188.1	190.0	192.2
27	158.2	148.0	142.8	140.4	155.5	152.3	150.6	149.0	159.0	161.2	163.2	165.4
28	140.7	136.4	134.4	130.3	143.2	140.3	138.7	137.2	141.7	142.8	144.2	146.0
29	122.8	117.8	116.2	110.6	124.6	122.1	120.7	119.4	125.8	126.9	128.9	130.0
30	106.4	104.6	103.6	100.7	111.3	109.1	107.9	106.7	108.4	110.9	112.7	114.7
31	89.1	80.5	78.5	74.6	97.2	95.3	94.2	93.2	90.2	91.0	93.8	94.5
32	81.9	75.0	72.4	68.5	85.3	83.5	82.6	81.7	82.9	83.2	84.6	85.0
33	68.0	60.4	58.9	56.8	76.6	75.0	74.2	73.4	73.0	74.0	76.0	77.1
34	67.6	58.6	55.1	50.2	70.2	68.8	68.0	67.3	70.0	70.5	71.8	72.4
35	52.7	45.6	42.3	35.5	61.8	60.6	59.9	59.2	57.5	58.1	60.2	62.5
36	46.1	35.2	34.3	29.4	51.5	50.4	49.9	49.3	51.0	52.0	53.7	54.8
37	39.3	31.6	29.6	22.2	45.1	44.2	43.7	43.2	42.0	42.3	44.0	45.0
38	31.0	25.9	24.2	19.4	39.6	38.8	38.4	37.9	38.0	39.3	40.2	41.3
39	30.2	23.9	22.9	16.3	31.2	30.6	30.2	29.9	31.2	31.4	32.0	33.5
40	22.0	15.3	14.8	8.4	22.9	22.4	22.2	21.9	23.0	24.0	25.1	26.2
41	18.0	12.2	10.9	6.2	17.7	17.3	17.1	16.9	19.0	19.5	20.6	20.8
42	11.5	9.5	8.7	4.8	13.5	13.2	13.1	12.9	13.0	14.5	14.9	15.2
43	10.0	7.6	7.0	3.9	10.3	10.1	10.0	9.9	11.0	11.5	12.0	12.3
44	5.0	4.1	3.9	3.0	6.1	6.0	5.9	5.8	5.5	5.6	6.0	6.2
45	3.0	3.0	2.8	2.6	3.6	3.5	3.5	3.4	3.5	4.1	4.2	4.8
46	2.0	2.0	1.9	1.9	1.6	1.6	1.6	1.6	2.4	2.4	2.5	2.6
47	1.0	0.9	0.6	0.6	1.0	0.9	0.9	0.9	1.3	1.2	1.2	1.2
48	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.8	0.6	0.6	0.6
49	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Total Fertility Rate per 1,000 women	2682.9	2529.3	2415.2	2303.0	2751.0	2695.3	2665.3	2636.3	2811.4	2859.5	2912.8	2968.7

SOURCE: Derived from cohort fertility rates as explained in the text (Section 4.624).

The cohort approach was preferred for the projection because of its merits over the period approach, which are briefly outlined in the introductory section. One of the main advantages of the cohort approach is that it enables the analyst to take advantage of the cumulated fertility rates to the latest year of record for projecting the remaining and completed fertility rates of the cohorts. The data on age-specific and cumulative fertility rates by cohort from 1900-01 are available for Alberta, which formed the main data for deriving the remaining fertility for cohorts with incomplete childbearing experience. Practical considerations based on available data, completion of the analysis in time, and consistency of results obtained were the main guideline in selecting the procedures used for the projection. The main procedural steps followed for the projection were: (i) projection of completed cohort fertility rates; (ii) the calculation of cohort age-specific fertility rates for cohorts born after 1943 on the basis of assumed age patterns of fertility; (iii) translation of the cohort rates into period age-specific fertility rates; and (iv) derivation of the annual number of births from the projected period fertility rates. The most difficult task in the operation was the first two steps; and a number of procedures were involved in completing the first two steps. In projecting the completed fertility rates and in deriving the age-specific cohort fertility rates we have relied upon the methodology and results of the cohort fertility projections for Canada. The areas of uncertainty in making fertility projections lie principally in the assumptions regarding completed fertility, especially for cohorts that will enter childbearing ages during the projection period, and its distribution by age of women. Some of the procedures we followed may be questioned for their statistical sophistication and the underlying subjective elements. Until a foolproof method that can stand the test of demographic theory and statistical sophistication is developed for cohort fertility projections, some of the drawbacks in the procedures used cannot be eliminated.

No doubt there is scope for further research in developing suitable methods for projecting the completed fertility rates for those with incomplete fertility and for translating the cohort age-specific fertility rates into period rates. A great deal of additional information on nuptiality pattern, parity distribution, fertility expectation and a host of related socio-economic data are required for the development of a satisfactory socio-demographic model that could be used for long-term fertility projections. It is hoped, however, that the fertility projections we have prepared will be adequate for the purpose in this study, will stimulate interest in cohort fertility analysis and projections and open new avenues for further research in this complex and rapidly developing field of cohort analysis and projections.

MIGRATION PROJECTIONS

Migration, both internal and international, is an important component of population change in Alberta and the most unstable parameter for population projections. The assumptions about future migration are difficult to make in view of the multiplicity of factors, demographic and non-demographic, that govern the volume and pattern of migration. The major problems are data, methodology and substantive research on these factors and their impact, *ex post* or *ex-ante*, on migration. For a long time, therefore, the challenge of making sophisticated migration projections will remain and call for more efforts towards creating this capability. In the meantime, all that can be done is to make the most use of available migration data/estimates and arrive at somewhat reasonable migration inputs and projections.

5.1 Migration Data

Migration to Alberta is composed of two broad groups: (a) international (or external) migration, and (b) internal migration. The external or international migration in turn comprises of immigrants and emigrants. In the same manner, the internal migration, i.e. interprovincial migration in the present case, consists of in-migrants and out-migrants. The distinction between these two groups is that the former denotes movement of people across the national boundaries and the latter across the provincial boundaries. The other types of internal migration, although important, are not relevant for provincial population projection. For the purpose of preparing projections, information on each of these four categories or types of movement must be viewed as the ideal requirement. Furthermore, projections require in essence the flow statistics vis-à-vis stock data.

Data problems, both collection and quality, are generally serious in respect of migration both internal and international which contrasts rather sharply with the amount of information gathered regarding the two other components of demographic change, namely, mortality and fertility. More seriously, the flow statistics are hard to get and virtually non-existent for three categories of movement with the exception somewhat of immigration. The following paragraphs review briefly the migration data available for Alberta in order to underline the nature and limitations of data used in this study and to highlight the information needs in the migration field for possible development of new data collection systems in future that will facilitate the adoption of more sophisticated techniques of migration projections.

The population census is the single major source of information on migration in Canada and the provinces (for details of census data on migration, see George, 1970;

Stone, 1969; and Kalbach, 1969). The 1941, 1946 and 1961 censuses collected direct information on migration by asking the respondents to state the province or the country of last permanent residence. Historical estimates of migration can also be obtained on the basis of place of birth data collected in the censuses or indirectly by applying the census survival ratio method to the age-sex data obtained in two censuses. Apart from the several limitations of migration figures obtained directly in the above censuses and of migration estimates derived indirectly from the census data, these statistics are stock data and not best suited for projection purposes. For example, the 1961 census migration data (i.e. place of residence data), refer to "five-year mobility" and do not yield the total migration which is of prime importance to the projectionists. The figures represent only the survivors of migrants in 1961 who moved during the 1956-61 migration interval. Thus, the data do not reflect the movement of people who died or left the province between June 1, 1956 and June 1, 1961 and included only a single (i.e., last) move of persons over the five-year period.

In contrast to the above stock data, the flow statistics will record continually all events or in the present case, all movements of people. Two good examples of flow statistics are the births and deaths registration systems. Such flow statistics exist regarding immigration for Canada and the provinces. For emigration, however, no such statistics are available and our present knowledge of emigration from Canada and provinces are based on estimates derived from immigration records of the United States and/or the data obtained in the population censuses of Canada.

Also, there is no direct source of information for internal migration, be it in-migration or out-migration. To put it differently, there exists no migration registers similar to birth/death registers. Therefore, the present knowledge about in-migration to and out-migration from Alberta is to be based on estimates derived from symptomatic variables. These are usually socio-economic variables which show a high correlation with the migration of people and for which the flow data are collected. School enrollment statistics, hospital insurance records, motor vehicle registration data are some examples of symptomatic variables that may be used for estimating internal migration.

Beginning 1956,[1] the estimates of interprovincial migration in Canada were based on the movements of families in receipt of family allowances reported by the Department of Health and Welfare (Family Allowances Section). The method of estimation is briefly as follows: The reports (monthly) from the Department of National Health and Welfare show the number of files of families receiving family allowance that have been transferred from one province to another. Based on these records, the net number of families moved into or out of each province, say, Alberta, is obtained for a given year. This number is then multiplied by the average number of children in families receiving allowance to obtain the number of migrant children under 16. The ratio of migrant children to all children under 16 of the province was then calculated and applied to the population over 16 to arrive at estimates of adult migrants (i.e. 16 years and over). This estimate is blown up by an adjustment factor (i.e., 1.1) to account for the movement of non-family adults. The addition of estimates of migrant children and migrant adults gives the total net migration either in or out of Alberta (for details, see Kasahara, 1963; and Nagnur and Fleming, 1970).

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[1] Before 1956, the estimates of interprovincial migration were derived from various sources: the 1941 census data on migration, ration-card counts during the Second World War and the post-war Labour Force Sample Surveys conducted by DBS. For more details see Canada, Dominion Bureau of Statistics, Population 1921-1966, Catalogue No. 91-511 (Ottawa: Queen's Printer, 1969), pp. 5-7.

5.2 Trends in Migration

Table 5.1 presents the contribution of migration (internal and international together) to population changes in Alberta during 1955-70. Two important features of the role of migration in this province are evident from the table. Firstly, the size of migration was large and secondly, it was not always positive (i.e., a gain). Over the long period of 1955-70, the migration contributed about 23 percent of the total population growth. In absolute

Increase and Net Migration, 1955-70.

(numbers in thousands)

Year / Period (June 1 to May 31)	Total Population (at end of period)	Growth		Contribution of natural increase		Contribution of net migration	
		Number	Per-centage	Number	Per-centage	Number	Per centage
				(a) Quinquennial			
1955-60	1,291.0	200.0	18.33	141.1	70.6	58.9	29.4
1960-65	1,450.0	159.0	12.32	143.1	90.6	15.9	10.6
1965-70	1,598.7	148.7	10.26	105.0	70.6	43.7	29.4
				(b) Annual			
1955-56	1,123.1	32.1	2.94	26.8	83.5	5.3	16.5
1956-57	1,164.0	40.9	3.64	27.4	67.0	13.5	33.0
1957-58	1,206.0	42.0	3.60	28.1	66.9	13.9	33.1
1958-59	1,248.0	42.0	3.48	28.7	68.3	13.3	31.7
1959-60	1,291.0	43.0	3.44	30.1	70.0	12.9	30.0
1960-61	1,332.0	41.0	3.17	30.0	73.2	11.0	26.8
1961-62	1,369.0	37.0	2.77	29.6	80.0	7.4	20.0
1962-63	1,403.0	34.0	2.48	29.8	87.6	4.2	12.4
1963-64	1,430.0	27.0	1.92	28.3	104.8	- 1.3	- 4.8
1964-65	1,450.0	20.0	1.39	25.4	127.0	- 5.4	-27.0
1965-66	1,463.2	13.2	0.91	21.5	162.9	- 8.3	-62.9
1966-67	1,490.6	27.4	1.87	21.4	78.1	6.0	21.9
1967-68	1,525.8	35.2	2.36	20.6	58.5	14.6	41.5
1968-69	1,561.4	35.6	2.33	20.1	56.5	15.5	43.5
1969-70	1,598.7	37.3	2.39	21.4	57.4	15.9	42.6

SOURCE: Based on the unpublished worksheets relating to annual population estimates prepared in the Population Estimates and Projections Section, Census Division, Dominion Bureau of Statistics, Ottawa. See also DBS, Population by Sex and Age, 1921-66, Catalogue No. 91-511, pp. 42-53.

NOTE: The quinquennial contribution of net migration to the total growth was obtained by adding the annual net migration figures for the five years from 1955 to 1960, 1960 to 1965 and 1965 to 1970.

terms, the population increase was 509 thousand in this period of which the net migration accounted for 119 thousand and the natural increase (i.e. births minus deaths) for 389 thousand. On the average, the contribution of migration to population change amounted from seven to eight thousand a year.

In recent years, the role of migration was even greater and responsible for over 40 percent of the annual increase in population. The estimated migration amounted to about 15 thousand a year during 1967-70 which is double the long-term average observed in the preceding paragraph for the period 1955-70. Notwithstanding this recent upsurge, it is noteworthy that the province had lost population due to migration in 1963/64, 1964/65 and 1965/66. The net loss in these three years was estimated at 15 thousand or an average of five thousand a year. The figures for individual years, however, varied from about one thousand in 1963/64 to eight thousand in 1965/66. In contrast, the net gain through migration fluctuated even more widely between four thousand 1962/63 and sixteen thousand in 1969/70. To sum up briefly, the migration gain to Alberta was more common in the past (twelve out of fifteen years under study) and larger in size than the loss.

The explanation for the gain or loss of people may be sought quantitatively in terms of the four categories of migration listed earlier and qualitatively in terms of the demographic-economic factors responsible for the above migration trends. The qualitative explanation is generally difficult to offer and no detailed investigation is attempted here. A quantitative explanation only will be attempted in the following pages.

Trends of gross in-migration to and out-migration from the province are not known for the period under study, and the available estimates, as pointed out earlier, refer to the net internal migration or the balance of in- and out-migration. In view of the data limitation, the examination of past trends in net migration shown in Table 5.1 can be carried out in terms of only three streams, namely, immigration, emigration and net internal migration, or in terms of only the net international and net internal migration. Table 5.2 presents the available data/estimates for the different streams of migration to and from Alberta in the recent years. According to these figures, the net international migration in the past had always been positive whereas the net internal migration was in some years negative and in other years positive. The migration loss, observed during 1963/64, 1964/65 and 1965/66, was due to the larger outflow of people to the other provinces rather than to either a decrease in immigration or an increase in emigration. Emigration from Alberta was almost stable at about three to four thousand a year. In the same period, immigration to Alberta was seen rising and more than doubled during the last three years as compared to the early sixties. In fact, the recent striking contribution of

TABLE 5.2 -- Trends in Different Categories of Migration to and from Alberta during 1961-70.

YEAR June 1 to May 31	Natural Increase	Total Net Migration	Net Internal Migration	Net International Migration	Immigration	Emigration
				Numbers		
1961-62	29,600	8,226	6,517	1,709	4,789	-3,080
1962-63	29,800	4,945	3,479	1,466	4,642	-3,171
1963-64	28,300	- 1,009	- 2,945	1,936	4,952	-3,016
1964-65	25,400	- 5,841	- 7,578	1,737	6,292	-4,555
1965-66	21,500	- 8,613	-14,159	5,546	8,718	-3,172
1966-67	21,400	6,041	- 2,326	8,367	12,080	-3,713
1967-68	20,600	14,780	4,746	10,034	14,274	-4,240
1968-69	20,100	15,474	6,918	8,556	12,383	-3,827
1969-70	21,400	15,900	7,570	8,330	11,454	-3,124
	Population					
	Migration rate (per 1,000 population at the beginning of the year)					
1961-62	1,332,000	6.18	4.89	1.28	3.60	-2.31
1962-63	1,369,000	3.61	2.54	1.07	3.39	-2.32
1963-64	1,403,000	- .72	-2.10	1.38	3.53	-2.15
1964-65	1,430,000	- 4.08	-5.30	1.21	4.40	-3.19
1965-66	1,450,000	- 5.94	-9.76	3.82	6.01	-2.19
1966-67	1,463,200	4.13	-1.59	5.72	8.26	-2.54
1967-68	1,490,600	9.92	3.18	6.73	9.58	-2.84
1968-69	1,525,800	10.14	4.53	5.61	8.12	-2.51
1969-70	1,561,400	10.18	4.85	5.33	7.34	-2.00

SOURCE: Same as for Table 5.1.

migration to population growth was the result of large immigration, whereas the positive contribution by internal migration remained about the same level of, say, six thousand in a year. It may also be pointed out here that the great impact of migration during 1956-59 (see Table 5.1) was more due to net internal migration than international migration (or immigration).

In the light of the above findings, it may be hypothesized for the purpose of migration projections that when the population of the province increases through migration, this gain is more likely to result from net international migration, that is, immigration rather than internal (inter-provincial) migration. Likewise, if the province loses population, this loss is more likely due to the role of net out-migration rather than of net international migration.

5.3 Future Migration Trends

Two methods can be thought of to project the future migration for Alberta. The first may be termed the analytical method that rests on examining historical data and, most likely, extrapolation of statistical trends. This method, depending on the available data and studies, is to a varying degree arbitrary and subjective. The second approach is to base projections on sophisticated models that attempt to relate migration in a scientific way to a set of measurable socio-economic correlates of migration for which some reasonable projections exist or can be readily prepared. Models of this kind are still in their infancy and it is difficult to judge at this stage their efficiency and superior value for making projections. In the circumstances, the analytical method as used for the national population projections (Gnanasekaran, 1970), is adopted in this study as follows:

First, the net total migration (i.e. both international and internal migration) to Alberta since 1946 was ranked in order of magnitude specifying the top ten years when migration was largest and the bottom ten years when migration was lowest (Table 5.3). Taking into consideration the long-term prospects, the average for the ten best years of migration was found to be 15 thousand per year. Similarly, the average for the ten years of very low migration was roughly 2.7 thousand a year. This average included the three years, 1963/64, 1964/65 and 1965/66, when migration was actually negative. Excluding these three years on the assumption that there would be no negative migration in future, the average for ten years of low positive migration amounted, as indicated in Table 5.3, to 7.4 thousand a year.

In taking into consideration the short-term prospects, our focus was changed from an examination of trends since the post-war years to those of the more recent period (i.e., from 1961). Accordingly, following the definition that the short-term covers three years, the average for the three best years of migration (1969/70, 1968/69, and

TABLE 5.3 -- Ten Highest and Lowest Years of Migration during 1946-70

(number in thousands)

Rank	Highest Migration		Lowest Migration		Lowest Migration excluding the losing years	
	Year	Number	Year	Number	Year	Number
1	1953/54	20.2	1965/66	-8.3	1946/47	4.0
2	1952/53	16.4	1964/65	-5.4	1962/63	4.2
3	1969/70	15.9	1963/64	-1.3	1955/56	5.3
4	1968/69	15.5	1946/47	4.0	1966/67	6.0
5	1967/68	14.6	1962/63	4.2	1961/62	7.4
6	1957/58	13.9	1955/56	5.3	1950/51	7.5
7	1948/49	13.9	1966/67	6.0	1954/55	7.9
8	1956/57	13.5	1961/62	7.4	1949/50	9.5
9	1958/59	13.3	1950/51	7.5	1960/61	11.0
10	1959/60	12.9	1954/55	7.9	1947/48	11.5
Average (long-term) based on 10 years	Above years	15.1	Above years	2.7	Above years	7.4
Average (short-term) based on 3 years	1969/70, 1968/69 and 1967/68	15.3	1965/66, 1964/65 and 1963/64	-5.0	1962/63, 1966/67 1961/62	5.5

SOURCES: Based on Table 1 and the relevant unpublished data from DBS.

NOTE: Migration figures in this table may differ slightly from those in Tables 5.5 and 5.6 because of adjustments in the light of subsequent results.

1967/68) was calculated to be 15.3 thousand a year. The average for three recent years of low migration (1965/66, 1964/65 and 1963/64) was minus 5.0 thousand per annum, i.e., a loss of population. Excluding these years of negative migration, the average low positive migration in the short period amounted to 5.5 thousand a year.

For the future, over the short as well as the long periods, the net total migration may be anticipated to range from an average loss of 5 thousand a year to an average gain of 15 thousand a year. Since this range is considerably wide, it had been segmented, as shown in Table 5.4, into smaller ranges and the following four assumptions, namely, an average net migration (both international and internal) of (a) minus 5,000; (b) zero; (c) 7,500, and (d) 15,000 a year over the period 1970-85 are postulated for incorporation in the population projections.

TABLE 5.4 -- Assumed Average Annual Migration for Alberta during 1970-85

	Net Migration a Year
Assumption 1	- 5,000
Assumption 2	0
Assumption 3	7,500
Assumption 4	15,000
Assumption 5	22,500

The negative migration or population loss was rather seen, over the period under study, to be a short-term phenomenon occurring only in three out of the fifteen years. In the long-term, the momentum was definitely towards a substantial gain through migration. It is possible that this momentum may contunue into the future, perhaps even with greater force and that the level of migration in the coming years may exceed the observed average of 15,000 a year. Therefore, a fifth assumption extending the future range of migration to 22,500 a year is proposed in Table 5.4.

5.4 Age-Sex Composition of Migrants

The foregoing migration assumptions are postulated in aggregate terms. But, the projections are often needed in detail by age and sex, and therefore, the present section is devoted to project the age-sex pattern of future migration.

For this purpose, the age-sex composition of migrants during a single year, say, 1969/70 can be assumed to be the future pattern. But, the pattern of migration is subject to annual variations and therefore the adoption of a single year pattern may reflect more often the peculiar conditions of the selected year. Hence, it is considered rational to take the average age-sex pattern of migration over a period of three, five, seven or more years.[2]

Migration is normally selective of age and sex. These differentials by age and sex may be noticed for immigrants, emigrants, in-migrants and out-migrants. Ideally, therefore, to account for these differentials, it is imperative to examine per se the age-sex patterns of the above four categories of migration and to project them separately. Such an examination requires a most accurate age-sex data for each stream migration. It is pointed out earlier that the flow statistics are available for immigration only. Even in regard to these statistics, the computation of reasonable age-sex pattern presents a problem in the sense that the reported age refers to the date of arrival and not to a fixed date, say, as of 1st June as in the case of available census data or estimates of age-sex pattern derived from the census figures.

In respect of emigration and the net internal migration, only estimates of age-sex pattern that are mostly derived from the preceding censuses are available presently. Estimates, at the level of age-sex distribution, are probably less reliable for drawing any firm conclusions about the differentials in the age patterns of the four migration groups. The seeming differences may be due just to the estimation technique and/or the nature and sources of data used.

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[2] A similar approach was followed in the national projections for Canada. See Canada, Dominion Bureau of Statistics, The Population Projections for Canada, 1969-84, Analytical and Technical Memorandum No. 4, Census Division, DBS, Ottawa, April 1970, p. 24.

Because of these problems, our efforts, following the earlier procedure of making all assumptions in terms of net total migration, were devoted to the analysis of the age-sex pattern of the net total migration. Table 5.5 presents the average age-sex patterns of migrants during 1961-70 that are based on different periods, namely, three, five, seven and nine years. In order to compare and select a reasonable age-sex pattern for the future migrants, these different averages given in Table 5.5 are plotted separately by sex on Charts 5.1a and 5.1b. Since a great portion of migration gain is anticipated from immigration, the projected age-sex composition of immigrants, according to DBS national projections (DBS, April 1970), has also been shown in these charts.

The three-year average pattern based on 1967/68, 1968/69 and 1969/70 resembles closely the age-sex pattern forecast for immigrants in the national projections. The considerable deviation of the remaining patterns based on five, seven and nine years may be attributed to the net out-migration in these periods with age-sex pattern of out-migrants different from those moving into the province. These departures are not considered justifiable in the light of substantial contribution of immigration anticipated under Assumptions 3 to 5. At the same time, it is

TABLE 5.5 -- Average Age-Sex Composition of Migrants Based on Three, Five, Seven and Nine Years, Census Years 1961-62 to 1969-70.

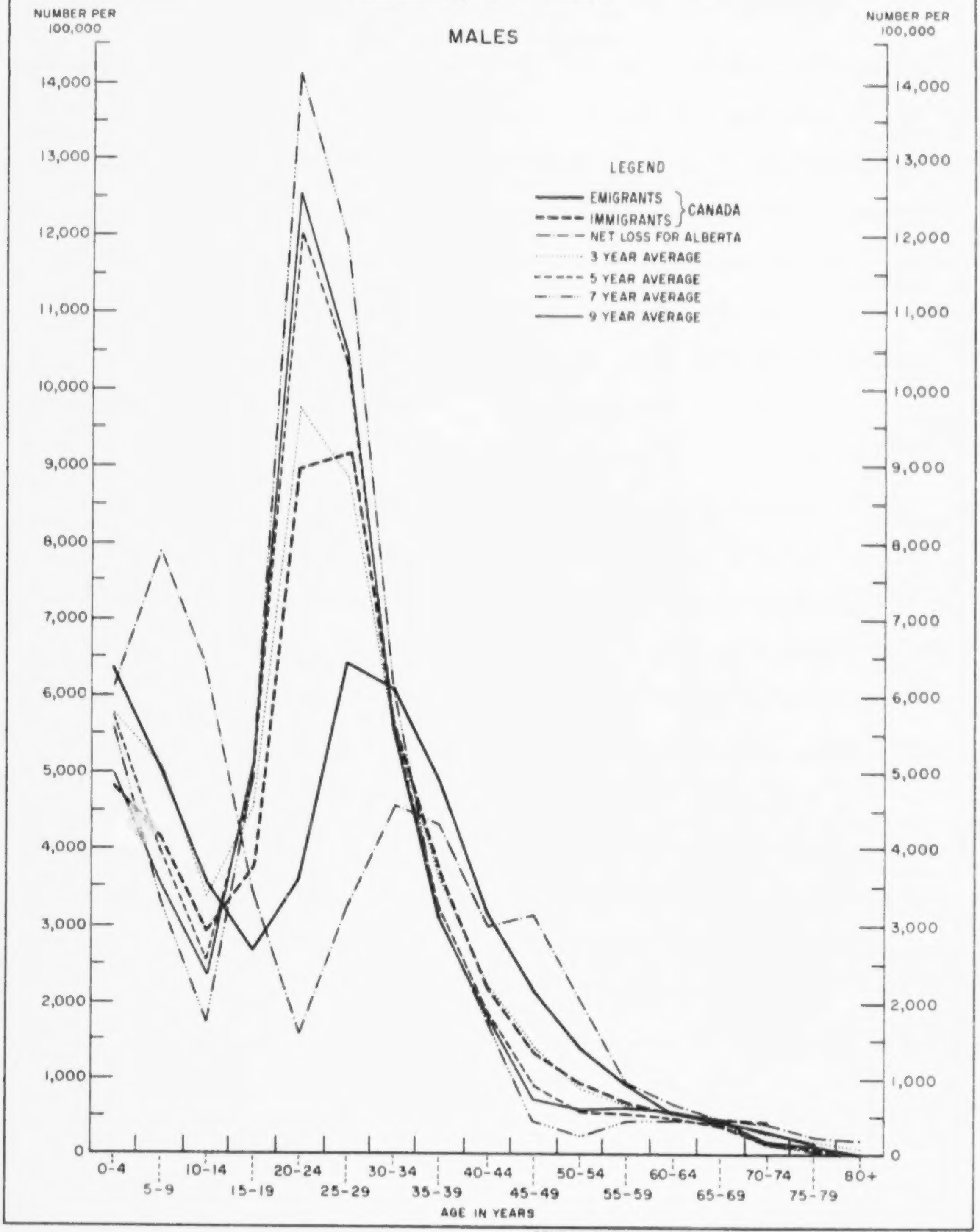
ALBERTA

Age	3-Year Average 1967-68 to 1969-70				5-Year Average 1965-66 to 1969-70				7-Year Average 1963-64 to 1969-70				9-Year Average 1961-62 to 1969-70			
	Number		Distribution (per 100,000)		Number		Distribution (per 100,000)		Number		Distribution (per 100,000)		Number		Distribution (per 100,000)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0-4	888	772	5,788	5,030	503	447	5,785	5,139	292	270	5,567	5,135	277	255	4,992	4,589
5-9	780	681	5,080	4,435	348	301	4,002	3,462	175	135	3,339	2,571	198	151	3,570	2,714
10-14	520	457	3,388	2,980	221	198	2,539	2,280	91	81	1,728	1,543	130	105	2,340	1,885
15-19	694	628	4,524	4,092	424	376	4,876	4,320	260	239	4,960	4,552	283	251	5,094	4,527
20-24	1,497	1,421	9,755	9,260	1,046	956	12,035	11,000	740	648	14,103	12,337	695	659	12,536	11,873
25-29	1,364	1,067	8,887	6,952	902	659	10,379	7,584	625	393	11,913	7,491	577	406	10,404	7,311
30-34	866	646	5,644	4,207	496	357	5,705	4,101	317	216	6,046	4,109	311	247	5,609	4,451
35-39	557	428	3,631	2,786	282	203	3,248	2,332	166	102	3,156	1,943	180	137	3,237	2,478
40-44	344	277	2,239	1,803	163	124	1,875	1,422	91	50	1,725	961	102	83	1,835	1,488
45-49	212	191	1,381	1,244	79	81	913	929	23	25	441	482	42	55	755	994
50-54	133	144	864	938	48	69	554	798	13	34	242	645	31	56	561	1,012
55-59	96	141	625	921	46	87	527	1,001	23	57	435	1,086	33	69	603	1,236
60-64	85	129	554	838	43	77	495	881	24	57	463	1,091	32	65	577	1,174
65-69	67	95	439	621	34	58	396	665	22	43	411	819	25	48	453	857
70-74	40	54	263	350	16	27	184	315	9	19	169	362	11	23	204	407
75-79	23	27	152	178	9	12	101	140	5	8	90	147	6	9	114	156
80-84	12	11	76	74	2	2	28	28	0	0	0	3	0	1	8	10
85-89	2	-1	11	-7	-1	-2	-12	-21	-1	-2	-19	-38	-1	-2	-16	-32
90+	0	-0	0	-2	-0	-0	- 2	- 2	-0	-0	- 3	- 3	-0	-0	- 2	- 2
TOTAL	8,181	7,168			4,663	4,032			2,875	2,375			2,933	2,614		

CHART 5.1a

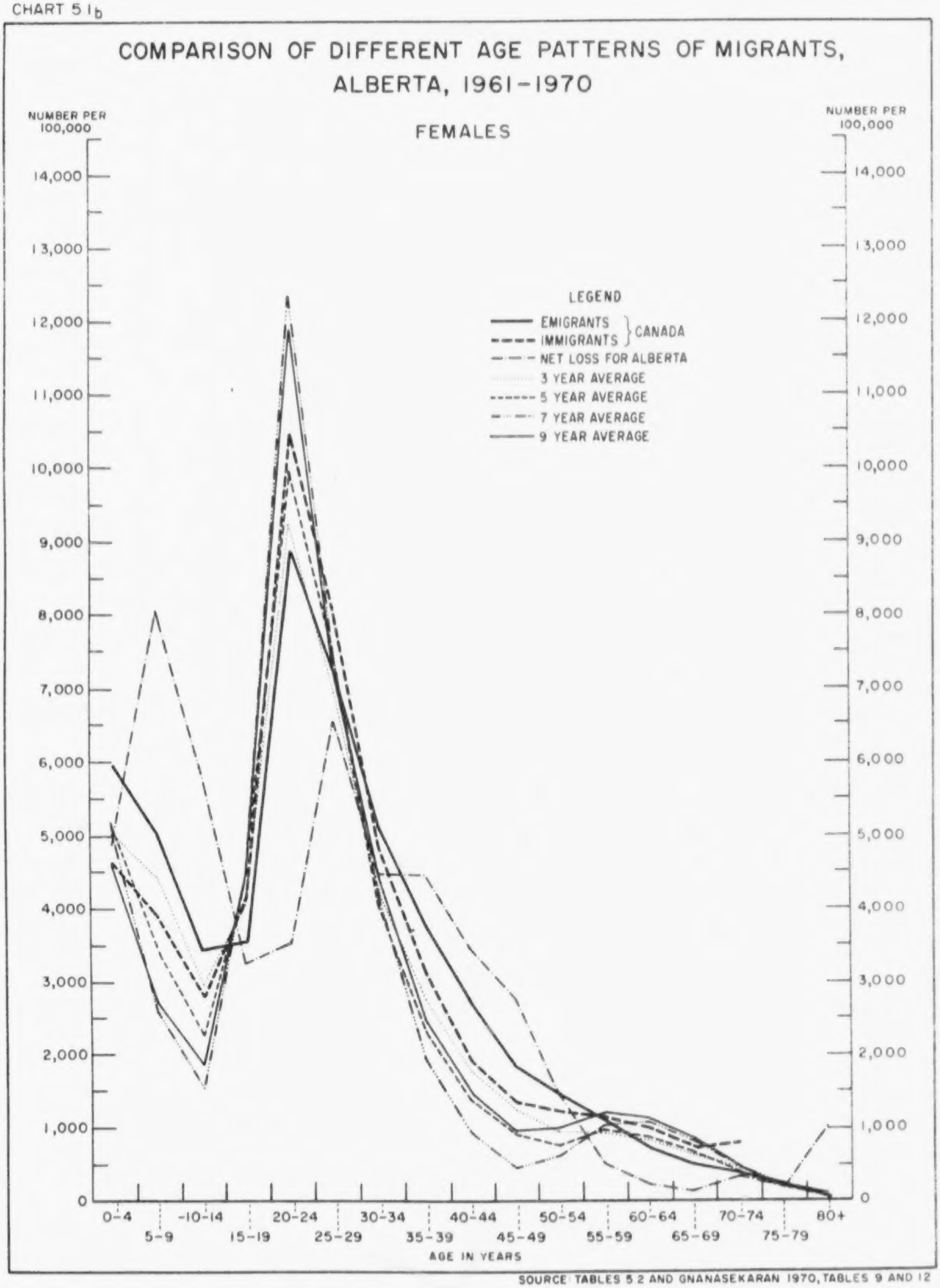
COMPARISON OF DIFFERENT AGE PATTERNS OF MIGRANTS, ALBERTA, 1961-1970

MALES



SOURCE: TABLES 5.2 AND GNANASEKARAN 1970, TABLES 9 AND 12

CHART 5 Ib



COMPARISON OF DIFFERENT AGE PATTERNS OF MIGRANTS, ALBERTA, 1961–1970

FEMALES

SOURCE: TABLES 5.2 AND GNANASEKARAN 1970, TABLES 9 AND 12 not proposed here to adopt the age-sex pattern of immigrants assumed in the national projections because the age-sex pattern of in-migrants may well differ from that of immigrants. The three-year average age pattern which is free from the effects of negative migration and combines the relative influences of both in-migration and immigration is therefore assumed through 1985 for distributing the future migrants under Assumptions 3 to 5 by age and sex.

The negative migration was seen earlier to result from marked out-migration. The age-sex composition of people moving out of Alberta under Assumption 1 is assumed to be the same as the average age-sex pattern observed during the three years of net negative migration, i.e., 1963/64, 1964/65 and 1965/66. The assumed distribution is shown in Table 5.6. These two assumed patterns obtained by five-year age groups and sex are here distributed into single years of age by using the sprague multipliers, and are presented in Table 5.7.

It must be pointed out that the present knowledge about the fertility and mortality levels among migrants is scant. Therefore, it was assumed in this study that, following the year of arrival, the future mortality and fertility of migrants would be the same as those projected for the non-migrant population.

TABLE 5.6 -- Assumed Age Sex Composition of Migrants by Five Year Age Groups and Sex through 1985

(number per 100,000)

Age Group	Assumption 1		Assumptions 3 to 5	
	Males	Females	Males	Females
0-4	6,105	4,870	5,774	5,018
5-9	7,903	8,045	5,068	4,424
10-14	6,422	5,840	3,380	2,973
15-19	3,447	3,259	4,513	4,082
20-24	1,584	3,544	9,733	9,239
25-29	3,227	6,519	8,866	6,935
30-34	4,553	4,482	5,631	4,197
35-39	4,307	4,462	3,623	2,780
40-44	3,007	3,499	2,234	1,798
45-49	3,130	2,794	1,378	1,241
50-54	2,050	1,487	862	936
55-59	957	511	637	919
60-64	666	213	552	836
65-69	420	149	438	620
70-74	414	323	262	444
75-79	239	220	152	243
80-84	213	1,028	76	117
85+	39	72	10	9
All ages	48,683	51,317	53,189	46,811

TABLE 5.7 -- Assumed Age Sex Composition of Migrants by Single Years of Age and Sex through 1985.

(number per 100,000 persons)

Single Years of Age	Assumption 1		Assumptions 3 to 5	
	Males	Females	Males	Females
0	860	686	1,036	895
1	1,082	863	1,137	986
2	1,262	1,006	1,193	1,038
3	1,400	1,117	1,211	1,055
4	1,501	1,198	1,197	1,044
0 - 4	6,105	4,870	5,774	5,018
5	1,567	1,599	1,156	1,009
6	1,602	1,651	1,096	956
7	1,607	1,652	1,021	892
8	1,586	1,610	939	820
9	1,541	1,533	855	747
5 - 9	7,903	8,045	5,068	4,424
10	1,478	1,426	771	675
11	1,399	1,294	690	606
12	1,302	1,160	637	562
13	1,186	1,037	627	553
14	1,058	924	654	577
10 - 14	6,422	5,840	3,380	2,973
15	929	808	681	599
16	801	690	696	604
17	679	607	797	701
18	568	574	1,021	934
19	470	580	1,318	1,244
15 - 19	3,447	3,259	4,513	4,082
20	378	585	1,600	1,538
21	287	583	1,891	1,847
22	249	639	2,084	2,026
23	289	777	2,117	1,997
24	381	960	2,041	1,831
20 - 24	1,584	3,544	9,733	9,239
25	473	1,139	1,972	1,678
26	573	1,338	1,894	1,512
27	664	1,438	1,791	1,357
28	733	1,381	1,671	1,240
29	784	1,224	1,538	1,148
25 - 29	3,227	6,519	8,866	6,935
30	840	1,080	1,391	1,037
31	897	922	1,228	914
32	935	816	1,089	812
33	946	807	994	741
34	937	857	928	692
30 - 34	4,553	4,482	5,631	4,197
35	925	888	858	644
36	913	919	789	601
37	882	927	723	558
38	828	894	658	512
39	759	835	596	465
35 - 39	4,307	4,462	3,623	2,780
40	687	783	539	424
41	606	729	488	388
42	557	685	442	355
43	561	659	401	327
44	595	644	364	304
40 - 44	3,007	3,499	2,234	1,798

TABLE 5.7 -- (continued)

Single Years of Age	Assumption 1		Assumptions 3 to 5	
	Males	Females	Males	Females
45	623	625	331	283
46	653	606	301	264
47	660	575	274	248
48	627	525	248	231
49	567	463	224	216
45 - 49	3,130	2,794	1,378	1,241
50	513	404	203	202
51	461	345	185	190
52	408	291	169	182
53	358	244	157	180
54	311	203	147	181
50 - 54	2,050	1,487	862	936
55	262	162	139	183
56	212	123	132	185
57	175	92	126	186
58	157	72	122	184
59	151	62	119	181
55 - 59	957	511	637	919
60	146	53	116	178
61	144	48	114	175
62	139	44	112	170
63	127	37	108	162
64	111	31	103	152
60 - 64	666	213	552	836
65	98	27	98	142
66	86	23	94	132
67	78	25	89	122
68	77	32	82	115
69	81	43	74	109
65 - 69	420	149	438	620
70	84	55	66	103
71	88	71	58	97
72	89	78	51	90
73	82	69	46	82
74	71	51	42	72
70 - 74	414	323	262	444
75	61	34	38	63
76	50	11	34	55
77	43	12	30	47
78	42	51	27	41
79	44	112	24	37
75 - 79	239	220	152	243
80	45	148	19	32
81	45	184	17	28
82	44	215	15	23
83	42	236	13	19
84	38	246	12	15
80 - 84	213	1,028	76	117
85+	39	72	10	9
All Ages	48,683	51,317	53,189	46,811

SOURCE: Based on Table 5.6.

RESULTS OF POPULATION PROJECTION

6.1 Projection Series and Selection

The assumptions covering alternative trends per se in regard to the future course, particularly of fertility and migration prepared in the preceding chapters, must be pieced together to obtain the population projections. This integration can be done in the following two ways: Firstly, it is common to combine these assumptions in all possible ways and present all the resulting population projections. This procedure may be applicable to areas that are not affected by migration, and consequently involves fewer assumptions in all to combine.

However, when several assumptions are made to allow for alternative migration trends and/or to account for wide variations in future mortality and fertility, the combination of these assumptions in all possible ways yields too numerous sets to select meaningfully a few series out of them. In this situation, an alternative approach may be more useful than the previous one. The second procedure, therefore, is to produce projections for all possible combinations of proposed assumptions and select a few projections out of them. This approach entails more time and cost, but it enables, while dealing with many assumptions, a meaningful selection after the results of all possible combinations of various inputs have been examined rather than before as in the case of the first procedure.

The population of Alberta has been earlier found to be significantly governed by the component of migration which made it desirable for a number of assumptions regarding its future influence. Hence, for the purpose of integrating the projection results, the second procedure is followed in the present study. The combination of one mortality, three fertility and five migration assumptions made earlier has produced in all fifteen projections. These projections, with their underlying assumptions, are given in Appendix Table P.1.

Four projections, called Series A, Series B, Series C and Series D are, however, presented in detail in this report. These series are selected, after detailed evaluation (Gnanasekaran, 1969b) in such a way as to cover the range of probable trends in migration and fertility. The specific assumptions underlying these four series are shown in Table 6.1.

Series A presents the "highest" projections for Alberta up to 1985. Assuming zero net migration and low fertility, from Series D may be considered the "lowest" projections for the province. Series B and Series C reflect the probable demographic trends in future depending on the prospects of migration. Both these series assume medium fertility and differ only in regard to underlying net migration assumption which, under Series B, involves a gain of 15,000 persons a year and under Series C of 7,500 persons each year.

TABLE 6.1 -- Fertility and Migration Assumptions underlying Projection Series A, Series B, Series C and Series D

Projection	Fertility Assumption	Migration Assumption
Series A	High fertility	Net migration gain of 22,500 persons a year
Series B	Medium fertility	Net migration gain of 15,000 persons a year
Series C	Medium fertility	Net migration gain of 7,500 persons a year
Series D	Low fertility	Zero migration a year

NOTE: The mortality assumption is the same for all series.

6.2 Total Population

All four projections in Table 6.2 show that the population of Alberta would be below two million by 1975. This mark is anticipated to exceed under Series A and Series B in the year 1980, and under Series C in 1985. In the absence of migration, this size is not likely to be reached by the province before 1985 as shown by Series D.

In the next five years (i.e., 1970 to 1975), the population is expected to increase under Series B by 198 thousand and, under Series C by 158 thousand, or, at an average (arithmetic) rate of about 2.5 percent and 2.0

TABLE 6.2 -- Projected Population of Alberta, 1970-1985
(Figures as of June 1)

Year/Period	Series A	Series B	Series C	Series D
	(In thousands)			
1970 (base)	1600.0	1600.0	1600.0	1600.0
1971	1644.6	1636.3	1628.8	1620.4
1972	1692.2	1675.0	1659.7	1642.6
1973	1741.5	1714.9	1691.6	1665.1
1974	1792.5	1756.0	1724.4	1688.0
1975	1845.4	1798.2	1758.2	1711.5
1980	2136.0	2027.4	1941.8	1835.6
1985	2462.2	2278.2	2143.0	1965.7
	(Percent increase)			
1970 to 1975	15.34	12.39	9.89	6.97
1975 to 1980	15.75	12.75	10.44	7.25
1980 to 1985	15.27	12.37	10.36	7.09

SOURCE: Based on Tables P.2 to P.5

percent a year, respectively. The projected increase during 1970-71 range from 29 thousand to 45 thousand, according to the three Series A, B and C which assume the inflow of people from other provinces and abroad. The total population is expected to be around 1636 thousand in 1971 (i.e., Series B).

6.3 Population Composition

Besides size, the implications of emerging population composition are important for planning and policy-making. Attention is given here only to the influence of the age-structure. The diversified economic, social and political correlates of population growth are implicit in the changing age structuresof population. Thus, other things being equal, a relatively young population implies the need for more schools and greater dependency burden on the society. In an area where population is not affected by migration, changes in age structure are mainly the result of variations in fertility rate. However, in Alberta, where migration is an important component of population growth, migration with its age selectivity plays an important role in bringing about shifts in population structure.

The emerging population structure of Alberta is examined by grouping the population in three age groups: 0-14, 15-64 and 65 and over, which may be assumed to correspond roughly to the three major phases of the life cycle:

youth (under 15), adulthood (15-64), and old age (65 years and over). The composition of Alberta's projected population according to these three stages of life cycle is presented in Table 6.3.

One notable trend that may be expected is the consistent decline in the proportion of population under 15 years of age between 1970 and 1980 under all series. The reduction will be greatest under Series D (low fertility assumption) from 32.4 in 1970 to 27.1 in 1980, i.e., 16.4 percent. The variations in the proportion of young population reflect the impact of different assumptions on fertility change. In fact, under the low fertility assumption even the absolute number would decrease during this period. However, between 1980 and 1985 it is expected that the proportion of population under 15 will register a moderate increase under all series.

Concomitant with the fall in the proportion of youth, the proportion of population 15-64 years of age is anticipated to increase both in absolute and relative terms. The proportion 15-64 is expected to increase consistently between 1970 and 1980. The growth of this group would be higher than the growth in all age groups under all series. Between 1970 and 1980, while the growth rate of this group will vary between 40.7 percent and 23.1 under the four series, the corresponding growth rate of the total population will vary only between 33.5 percent and 14.7 percent. It is expected, however, that the proportion 15-64 will

TABLE 6.3 -- Projected Age Composition of Population of Alberta, Both Sexes, 1970, 1975, 1980 and 1985

(Numbers in thousands)

Year/Age (as of June 1)	Series A		Series B		Series C		Series D	
	Number	%	Number	%	Number	%	Number	%
1970								
0-14	519.0	32.44	519.0	32.44	519.0	32.44	519.0	32.44
15-64	964.7	60.29	964.7	60.29	964.7	60.29	964.7	60.29
65+	116.3	7.27	116.3	7.27	116.3	7.27	116.3	7.27
All ages	1600.0	100.00	1600.0	100.00	1600.0	100.00	1600.0	100.00
1975								
0-14	550.5	29.83	532.0	29.59	520.2	29.59	501.6	29.31
15-64	1160.4	62.88	1132.7	62.99	1105.4	62.87	1078.3	63.00
65+	134.5	77.29	133.5	7.42	132.6	7.54	131.6	7.69
All ages	1845.4	100.00	1798.2	100.00	1758.2	100.00	1711.5	100.00
1980								
0-14	620.1	29.03	570.9	28.16	544.1	28.02	496.6	27.05
15-64	1357.7	63.56	1300.6	64.15	1244.0	64.06	1187.6	64.70
65+	158.2	7.41	155.9	7.69	153.7	7.92	151.4	8.25
All ages	2136.0	100.00	2027.4	100.00	1941.8	100.00	1835.6	100.00
1985								
0-14	752.1	30.55	661.9	29.05	619.3	28.90	534.6	27.20
15-64	1523.9	61.89	1433.7	62.93	1344.9	62.76	1256.1	63.90
65+	186.2	7.56	182.6	8.02	178.8	8.34	175.0	8.90
All ages	2462.2	100.00	2278.2	100.00	2143.0	100.00	1965.7	100.00

SOURCE: Computed from Table P.2 to P.5

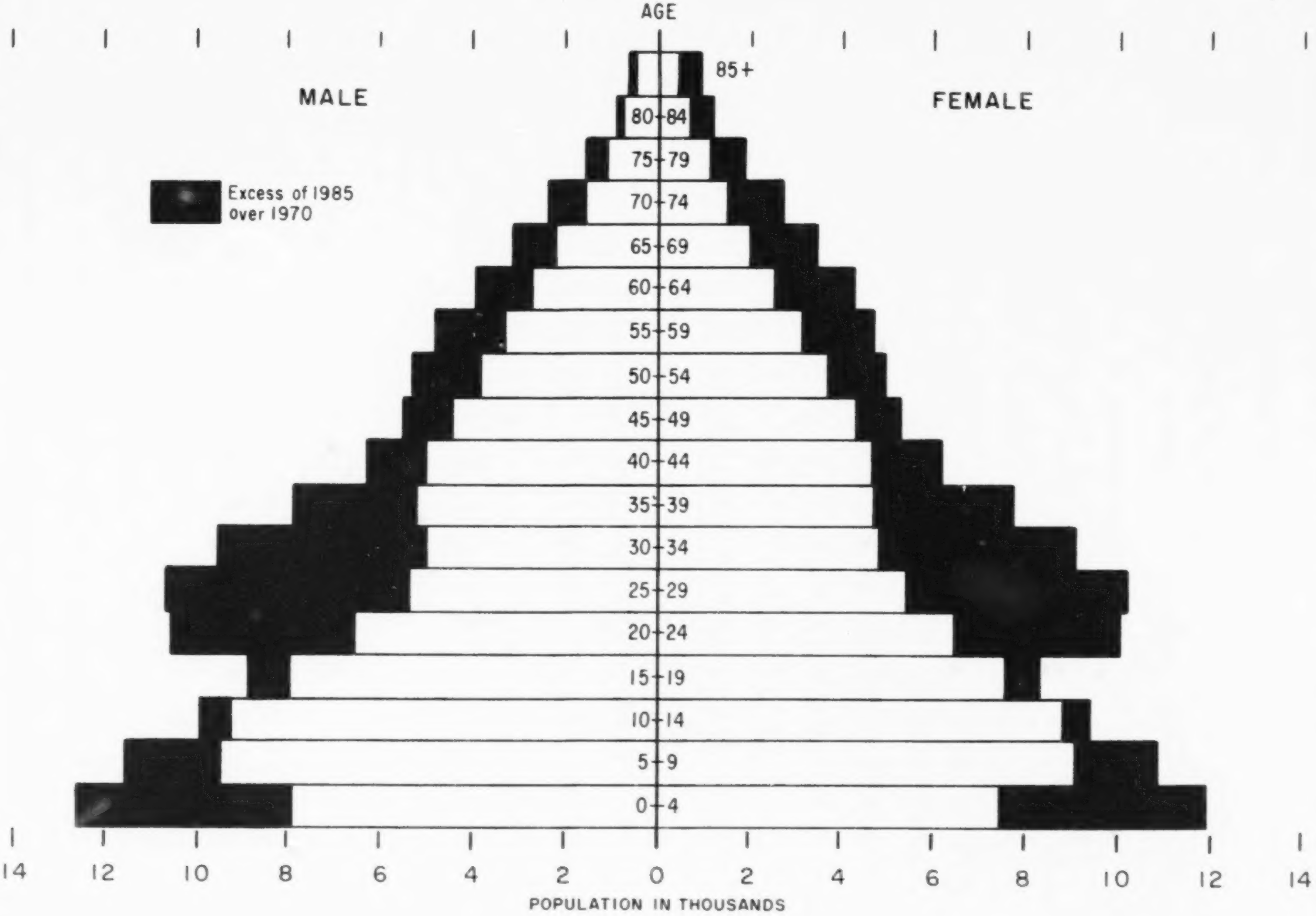
decline between 1980 and 1985.

The proportion of population 65 years of age and over is expected to increase consistently during the entire projection period. The proportion will increase from 7.27 percent in 1970 to 7.56 percent and 8.90 percent under Series A and D, respectively, in 1985. The index of aging, which is defined as the number of persons aged 65 and over per 100 children under 15 years of age, will increase from 22.4 in 1970 to 24.8 under Series A and 32.7 under Series D in 1985.

The changes in the age structure of Alberta's population between 1970 and 1985, as implied by the medium population projections (Series B) are portrayed in Chart 6.1. The change in the shape of the age pyramid between 1970 and 1980 shows the effects of low fertility level in the 1930's, the rise in fertility level and immigration in the post-war years, the steady decline in fertility since 1960, and the migration gain on the population structure of the province.

CHART 6.1

POPULATION OF ALBERTA
1970 AND 1985



SOURCE: TABLE P.3, SERIES B

LABOUR FORCE PROJECTIONS

7.1 Data Sources

Two main sources of data exist for a study of labour force and projections for Alberta. The first and most comprehensive is, of course, the census which presents a long time series for the province. Both 1951 and 1961 censuses which followed the labour force concept vis-à-vis the gainful approach in the earlier censuses, contain voluminous data for analysis. A new layer of general and more detailed tabulations of labour force will soon be added on the basis of 1971 census. These data, however, are so far subject to less study which is found rather to be a serious gap from the point of preparing labour force projections.

The second source is the monthly labour force survey conducted by the DBS. The survey, as designed presently, provides information for the Prairie provinces as a whole. Although unpublished data may be on file for each province, the sample size is, however, considered small to rely on the break-down of regional figures for Alberta and the other two provinces. In the circumstances, there is no option but to carry out most analyses using census data and draw inferences from them. This disadvantage is more serious for preparing labour force projections for, as pointed out before in the case of migration, the flow statistics are needed most for making projections.

The paucity of flow statistics of labour force for provinces is sometimes overcome, though not fully satisfactorily, by resorting to establishment survey data and administrative statistics which are the by-products of administering labour legislation as, for example, the Unemployment Insurance Act. Other useful sources are the immigration and taxation statistics and reports of the Canada Manpower Centres. These data, although immensely valuable for certain purposes, refer to segments of the labour force and therefore are of limited use to the present study which concerns the total labour force of Alberta. In the context, it is proposed here to depend wholly on census and labour force survey data, and piece together the two sources, notwithstanding their limitations and problems of comparability, for obtaining a reasonable picture of labour force trends in the province over the next fifteen years.

7.2 Size of Labour Force

The labour force of Alberta was 490 thousand at the time of the 1961 census, or about 57 percent of the total working age population (Table 7.1). This overall level was the highest among the provinces and differed by three percentage points from the level of 54 percent recorded for Canada (1961 census, DBS 94-501, pp. 2-4; Ostry, 1968, Table 1, p. 4). At a given time, the proportion (or level)

TABLE 7.1 -- Trends in Population and Labour Force of Canada and Alberta, 1951, 1961 and 1970

(as of June 1)

Year	Age Group	Population in '000s	Labour Force	
			In '000s	Percent of Population
		CANADA[a]		
Males				
1951	15+	4,911	4,114	83.8
1961	15+	6,039	4,643	77.7
1970	14+	7,614	5,733	75.3
Females				
1951	15+	4,832	1,162	24.1
1961	15+	5,984	1,764	29.5
1970	14+	7,712	2,732	35.4
Both Sexes				
1951	15+	9,742	5,276	54.2
1961	15+	12,023	6,458	53.7
1970	14+	15,325	8,465	55.2
		ALBERTA		
Males				
1951	15+	346	291	84.0
1961	15+	449	362	80.6
1970	14+	565	450	79.6
Females				
1951	15+	306	63	20.4
1961	15+	414	127	30.8
1970	14+	550	205	37.2
Both Sexes				
1951	15+	653	354	54.2
1961	15+	863	490	56.8
1970	14+	1,116	655	58.7

[a] Excluding Yukon and Northwest Territories

Note: Data for 1951 and 1961 are from the censuses. The figures for 1970 are based on the DBS Monthly Labour Force Survey for the week ending May, and estimates for Alberta are made in this study. See text for the method of estimation.

SOURCES: DBS, 1961 Census of Canada, Vol. III, Part 1, Catalogue No. 94-501, *Labour Force*, Table 2; DBS, *Seasonally Adjusted Labour Force Statistics, January 1954-December 1970*. Catalogue No. 71-201, (annual) Information Canada, Ottawa, May 1971, and DBS, *Estimated Population of Canada and Provinces by Age and Sex*, Catalogue No. 91-201 (annual), Table 1.

of population in the labour force is governed by a) the demographic structure of the province, and b) the behaviour or propensity of the population to participate in the labour force. Under the demographic structure lie the primary factors of sex and age characteristics, and the secondary factors of marital status, family size, rural/urban residence of population, etc. Besides, the subnational populations are to a varying degree influenced by migration which is normally age and sex selective. In the case of Alberta, the influence of migration has been heavy, as noticed in Chapter V. The role of migration (Chapter V) which may also be considered as a factor influencing the behaviour of resident population in economic activity, is merged in this study with population structure, and no attempt is made here to treat it separately as a third factor governing the labour force.

The sex distribution of labour force of Alberta shows that the proportion of males amounted to 80.6 percent of the population 15 years and over in 1961 (Table 7.1). This level was, however, not the highest among the provinces since Ontario had a slightly higher level, about 80.8 percent, in the same period. Similarly, the level of female labour force of Alberta (30.8 percent) ranked second after Ontario, which had about 32.6 percent of females in the labour force (1961 Census, DBS 94-501, pp. 2-4). The highest level of labour force noted earlier for Alberta in terms of the proportion for both sexes may therefore be attributed partly to the more favourable demographic structure of Alberta and partly to the propensity of population to participate in the labour force (i.e., the economic activity pattern).

The population projections made in this study take due account of the demographic forces (i.e., mortality, fertility and migration) that determine the future population structure of Alberta. The economic activity pattern is, therefore, of prime concern in this chapter and is examined below in detail to postulate the future trend of labour force component.

7.3 Pattern of Labour Force Participation

The available data on labour force participation by age and sex for Alberta refer to the week preceding 1961 census. The specific rates are given in Table 7.2 for the age groups 15-19, 20-24, 25-34, 35-44, 45-54, 55-64 and 65+, and compared with the corresponding rates for Canada in Column 3. The male participation in the labour force of Alberta ranked higher than of Canada in all age groups. The rate was strikingly higher for the young age group 15-19, with 46.0 percent of the population joining the labour force as compared to only 39.5 percent at the national level. In respect of females, however, the opposite was observed with the rate for Canada approximately 33.0 percent and for Alberta just 30.3 percent. The same tendency of lower rate of participation in the labour force was

TABLE 7.2 -- Labour Force Participation Rates by Age and Sex, Canada and Alberta, 1961 and 1970

ge group and sex	1961			1970	
	Rate (percent)		$\frac{\text{Col. 2}}{\text{Col. 3}}$	Rate (percent)	
	Canada[b] (1)	Alberta (2)	(3)	Canada (actual) (4)	Alberta (estimate) (5)=(4)x(3)
MALES					
<19[a]	39.5	46.0	1.163	38.9	45.2
20-24	86.6	90.8	1.048	88.4	92.6
25-34	93.9	95.5	1.017	96.8	98.5
35-44	94.2	95.8	1.018		
45-54	91.8	93.8	1.022	90.9	93.2
55-64	81.7	84.0	1.029		
65+	28.4	29.8	1.051	23.6	24.8
Total	77.7	80.6	1.038	77.3	
FEMALES					
<19[a]	33.0	30.3	0.920	29.7	27.3
20-24	49.3	46.8	0.950	60.6	57.6
25-34	29.5	30.0	1.017	40.4	43.0
35-44	31.0	34.4	1.112		
45-54	33.3	37.0	1.109	36.6	39.3
55-64	24.4	25.4	1.039		
65+	6.9	5.2	0.774	5.9	4.6
Total	29.5	30.8	1.045	36.2	

[a] This group denotes 15-19 in 1961 (census) and 14-19 in 1970 (labour force survey).

[b] Excludes Yukon and Northwest Territories

SOURCES: DBS, 1961 Census of Canada, Vol. III, Part I, Catalogue 94-501, Labour Force, Table 2, pp. 2-3 to 2-4; and Seasonally Adjusted Labour Force Statistics, January 1954-December 1970, Catalogue 71-201, pp. 166-205.

noticed among females aged 20-24 in Alberta. In all other age groups (excepting the old), the female participation was higher than Canada by one to four percentage points.

Similar information about the participation of population in labour force by age and sex is collected by the monthly Labour Force Survey; but, for the reason stated earlier, the break-down of the regional sample by age and sex for the three provinces (i.e., Alberta, Manitoba and Saskatchewan) will be even less reliable than the aggregate size of labour force of each province. In order, therefore, to obtain a recent picture of the pattern of labour force participation in Alberta, it is assumed in this study that the ratio of age-sex specific participation rates of the province to those of Canada obtained in 1961 would be the same in 1970. Accordingly, the ratios calculated in Column 3, Table 7.2 were applied to the respective age-sex participation rates that are available for Canada from the Labour Force Survey for the week ending May, 1970 (Column 4). The pattern of labour force participation thus estimated for Alberta is shown in Column 5, Table 7.2.[1]

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[1] To appraise the participation pattern for Alberta derived in Table 7.2, the same procedure was extended to Manitoba and Saskatchewan, and the estimated rates for 1970 were applied to the respective populations of these two provinces by age and sex. The results for the three provinces were added to obtain an estimate of the labour force of the Prairies which came close (i.e., 1440 thousand) to the labour force survey estimate for the region of 1415 thousand in May, 1970. Although the pattern could have been adjusted on a pro rata basis so as to tally with the survey estimate, this was considered unnecessary in this study.

7.4 Projections of Labour Force Participation Rates

The methodology is simple and involves analysis of past trends in the labour force participation rates for Canada before their application to project the pattern for Alberta through 1985. Table 7.3 presents the changes in the economic activity pattern by sex for Canada during the period of 1961-70. For the purpose of measuring the trend, the participation rates shown in the above table are the seasonally adjusted figures for the month of May.

7.41 Male Participation Rates

The rate of participation of males in the labour force of Canada as a whole declined without exception in all age groups during the sixties. The decline was largest in the old age group 65 and over in Table 7.3. A part of this decrease may be due to the changing age composition within this group. Further rise in the proportion of old men is anticipated in the coming years. Besides, the social security and the upward trend in the lifetime income of people may encourage early retirement from the labour force. It is therefore assumed that the same rate of decline in participation will continue for this age group in the seventies.

After the old age group, the greater reduction was in the young age groups. The decrease is generally attributed to the rising trend in higher education, and it is anticipated that the rate for ages 14 to 24 will decline

TABLE 7.3 -- Trends in Labour Force Participation Rates by Age and Sex, Canada, 1961-70
(in percent)

Age and Sex	Increase or Decrease from 1961 to 1970	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
MALES											
14-19	- 4.6	41.2	39.6	37.8	38.1	38.7	38.2	39.6	38.6	38.7	39.3
20-24	- 7.2	91.7	89.4	88.5	87.9	87.3	87.4	86.8	84.2	85.4	85.1
25-44	- 0.8	97.5	97.9	97.7	98.0	97.7	97.6	97.3	97.0	97.3	96.7
45-64	- 2.0	92.2	91.6	92.0	91.9	91.8	91.5	91.9	90.7	91.3	90.4
65+	-25.5	30.2	29.2	26.6	26.3	26.3	26.4	25.1	24.4	24.0	22.5
FEMALES											
14-19	- 9.4	34.1	31.5	28.9	30.0	30.2	31.4	32.1	29.3	31.6	30.9
20-24	+21.2	49.1	49.7	49.2	51.1	53.1	55.3	56.1	58.2	60.4	59.5
25-44	+34.3	29.7	29.4	29.9	31.6	32.8	33.9	35.4	35.9	38.9	39.9
45-64	+29.2	28.1	29.3	30.1	31.9	32.6	33.6	35.6	35.1	35.1	36.3
65+	- 1.7	5.8	5.7	5.3	6.7	6.0	6.0	5.9	5.5	5.8	5.7

Note: Rates are final seasonally adjusted series for the month of May.

SOURCE: DBS, Seasonally Adjusted Labour Force Statistics: January 1954-December 1970, Catalogue 71-201, pp. 169-181.

further at least about the same rate during 1970-1980. There was only a slight decline in the participation rates of middle age groups 25-44 and 45-64. It is assumed, therefore, that the past trend in labour force (1961-70) will continue into the future.

Accordingly, the observed total decline in male participation rates for Canada from 1961 to 1970 was applied to the estimated rates for Alberta in 1970 to yield the projected rates for 1980 in Table 7.4.

7.42 Female Participation Rates

From the point of labour force projections, the behaviour of women is the most crucial factor with the largest degree of uncertainty. In general, there has been a secular rise in the participation of females in economic activity, and the proportion of women with labour force attachment increased in Alberta from 30.8 percent in 1951 to 37.2 percent in 1961 as indicated in Table 7.1. This level was one of the highest in Canada which had about 35.4 percent of females in the labour force at the same period.

In Table 7.3 which presents recent trends by age groups, it is seen that the upward trend in female labour force participation still persists in the nation. The largest increase in participation was observed among women in the ages 25-44 from a level of 29.7 percent in 1961 to 39.9 percent in 1970. This amounts to a rise of about 34 percent in activity rates from 1961 to 1970. It was closely

TABLE 7.4 -- Comparison of Projected Rates of Labour Force Participation by Age and Sex for Alberta with Those for Ontario, Canada and U.S.A. for 1980

Age and Sex	Projected Participation Rates (percent)			
	Alberta 1980	Ontario 1981	Canada 1980	USA (White) 1980
MALES				
14-19	43.2	37.5[a]	36.7	57.4[b]
20-24	86.0	86.0	85.0	83.3
25-34	97.7	97.0	97.3	96.5
35-44		98.0	97.7	96.5
45-54	91.4	97.5	96.0	94.3
55-64		87.5	85.5	80.8
65+	18.5	21.0	21.7	22.0
FEMALES				
14-19	26.0 (24.8)	31.0[a]	31.1	41.9[b]
20-24	63.7 (69.8)	61.0	62.0	57.4
25-34	50.4 (57.8)	38.5	41.0	45.0
35-44		47.0 (53.0)	47.0	52.0
45-54	45.0 (50.8)	48.5 (54.5)	50.0	54.5
55-64		33.0 (42.0)	41.0	45.0
65+	4.5 (4.5)	5.0	7.2	8.6

[a] Rate for the age group 15-19

[b] Rate for the age group 16-19

Note: Figures in brackets denote high projections. The rates for Alberta were based on the assumption that the same percent change in participation rates observed during 1961-70 would continue till 1980.

SOURCES: Ontario, Department of Treasury and Economics, Ontario Labour Force Projections, 1968-1991, Table 1, p. 7; Wolfgang M. Illing et al., Population, Family, Household and Labour Force Growth to 1980, Table 4-1, p. 93; and Sophia C. Travis, "The U.S. Labor Force: Projections to 1985", Monthly Labor Review, May, 1970, Table 4, p. 8. For Alberta, see text.

followed by the age group 45-64 which recorded an increase of 29 percent in the same period. The dramatic development in the participation profile of women by 1961 was the emergence of two peak profiles in Canada among the married women as a result of marked increase in economic activity in the age group 35-44 (Ostry, 1968b, p. 5). Though the recent trends for the age group 25-44 point to further increase in participation, it is assumed here that this pace will slow down in the future. For the purpose of projections, therefore, one-half of the percent increase in participation rates during 1961-70 was applied respectively to the estimated activity rates of Alberta in 1970 to arrive at the participation in the age groups 25-44 and 45-64 in 1980. The same assumption was made for the age group 20-24 which also experienced a substantial rise in the sixties.

The rates for the young and the old women, like those of the men, declined during 1961-70. It is assumed that this downward trend would persist and that the percent decrease in participation would approximate one-half of that observed for Canada over the past decade. The projected participation would then be about 26.0 percent for females below 19 years and 4.5 percent for women over 65 years.

Table 7.4 presents the projected labour force participation rates for Alberta and selected areas. The male rates resemble closely the pattern projected for Ontario and Canada in 1980. However, the rates for females differ considerably for 1980. For Alberta, an alternative projection of female participation rates was given in Table 7.4 (figures in brackets) on the same basis that the male rates were projected, i.e., the same percentage change in participation rates noticed (for Canada) during 1961-70 would continue through 1980. A comparison of these rates, especially for the age groups 25-44 (57.8 percent) and 45-64 (50.8 percent), with those projected for U.S.A. suggests that they are rather too high. The rates are also found to be far higher than the projections for Ontario. Generally, the labour market behaviour of women in Ontario and U.S.A. exceeded the level of participation in Alberta. In the context, the projections based on moderate increase (i.e., one-half of the percentage increase or decrease observed during 1961-70) in female participation is preferred here.

After 1980, the participation rates for males and females are assumed to remain constant. The rates for each year shown in Table 7.5 were obtained by linear interpolation between the estimated rates by age and sex for 1970 (Table 7.2) and those projected for 1980.

7.5 Indicated Changes

Tables 7.6 to 7.10 present the projections of total labour force for Alberta by age and sex through 1985. These are obtained by multiplying the projected activity

TABLE 7.5 -- Projected Rates of Labour Force Participation by Age and Sex, Alberta, 1970 to 1985

(Rates in percent)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
MALES																
14-19	45.2	45.0	44.8	44.6	44.4	44.2	44.0	43.8	43.6	43.3	43.2	43.2	43.2	43.2	43.2	43.2
20-24	92.6	92.0	91.3	90.6	90.0	89.3	88.6	88.0	87.3	86.6	86.0	86.0	86.0	86.0	86.0	86.0
25-44	98.5	98.4	98.3	98.2	98.2	98.1	98.0	97.9	97.8	97.8	97.7	97.7	97.7	97.7	97.7	97.7
45-64	93.2	93.0	92.9	92.7	92.5	92.3	92.1	92.0	91.8	91.6	91.4	91.4	91.4	91.4	91.4	91.4
65+	24.8	24.2	23.5	22.9	22.3	21.6	21.0	20.4	19.7	19.1	18.5	18.5	18.5	18.5	18.5	18.5
FEMALES																
14-19	27.3	27.2	27.1	26.9	26.8	26.7	26.6	26.4	26.3	26.2	26.0	26.0	26.0	26.0	26.0	26.0
20-24	57.6	58.2	58.8	59.4	60.0	60.6	61.2	61.8	62.4	63.1	63.7	63.7	63.7	63.7	63.7	63.7
25-44	43.0	43.8	44.5	45.2	46.0	46.7	47.4	48.2	48.9	49.7	50.4	50.4	50.4	50.4	50.4	50.4
45-64	39.3	39.9	40.5	41.0	41.6	42.2	42.8	43.3	43.9	44.5	45.0	45.0	45.0	45.0	45.0	45.0
65+	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5

SOURCE: See Table 7.4 and text.

rates in Table 7.5 by projections of population in the corresponding age groups and sex under Series A, B, C, and D. The Monthly Labour Force Survey, as noted earlier, excludes the following categories of population, namely, the armed forces, inmates of institutions and Indians on the reserves. These three groups are estimated to constitute at the national level about two percent of the population of 14 years and over in 1966. The size of these groups for Alberta is not readily available and therefore, in this study, no attempt is made to adjust the projected population so as to arrive at what is called the labour force population or source population for labour force projections. Hence, the projections given below may be cautioned to be slightly overestimated. Further, these projections, like population, relate to June 1.

Series DL, which involves zero migration, indicates the smallest increase of about 80 thousand in the labour force during 1970-75 or roughly one-half of the projected change under Series AL. Series BL, which includes a net migration gain of 15,000 persons a year, shows a growth in the labour force of 119 thousand in the same period or an annual net increase of 24 thousand persons during 1970-75. The growth would be slightly below 20 thousand a year if migration is one-half the level assumed in Series BL.

Of the projected annual average increase of 24 thousand during 1970-75, ten thousand would be women. Under Series CL, the annual net addition to the female labour

TABLE 7.6 -- Projected Changes in Total Labour Force of Alberta, 1970-1985

(numbers in thousands)

Year/Period (June 1 to May 31)	Series AL	Series BL	Series CL	Series DL
1970 to 1971	25.8	22.0	18.0	14.5
1971 to 1972	27.0	23.3	19.6	15.7
1972 to 1973	27.2	23.6	19.9	15.9
1973 to 1974	28.8	24.3	20.4	16.2
1974 to 1975	28.9	25.6	20.6	16.9
1970 to 1975	137.7	118.8	98.5	79.2
1975 to 1980	150.6	125.0	104.5	83.2
1980 to 1985	127.6	111.1	88.2	64.5

SOURCE: Tables 7.7 to 7.10.

TABLE 7.7 -- Labour Force Projections for Alberta by Age and Sex, 1970 to 1985
Series AL: Based on Population Projection Series A

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
MALES																
14-19	43.8	45.7	47.3	48.8	50.1	51.1	52.0	52.8	53.3	53.0	52.0	51.2	50.2	49.2	48.4	48.1
20-24	60.3	64.2	68.0	71.2	74.9	78.1	80.9	83.5	85.7	87.7	89.2	91.2	92.9	94.4	95.6	95.1
25-44	200.7	206.9	213.9	221.5	229.8	238.7	248.5	259.0	270.2	281.9	294.3	307.5	221.2	335.3	349.5	363.7
45-64	130.9	134.2	137.7	141.4	145.2	149.0	152.6	156.1	162.7	165.9	169.2	172.5	175.7	178.9	182.3	180.0
65+	14.6	14.5	14.4	14.3	14.2	14.1	14.0	13.9	13.9	13.8	13.7	14.0	14.4	14.8	15.2	15.6
Total	450.3	465.5	481.3	497.2	514.2	531.0	548.0	565.3	585.8	602.3	618.4	636.4	654.4	672.6	691.0	702.5
FEMALES																
14-19	25.1	26.1	27.1	28.0	28.8	29.5	30.0	30.5	30.7	30.4	29.7	29.2	28.5	27.8	27.4	27.2
20-24	37.7	40.4	43.1	45.6	48.1	50.6	53.1	55.8	58.4	61.0	63.4	64.9	66.1	67.2	67.7	67.2
25-44	85.0	89.3	94.0	99.1	104.7	110.7	117.2	124.0	131.3	138.9	147.0	153.4	159.9	166.7	173.4	180.1
45-64	54.0	56.7	59.4	62.1	64.9	67.6	70.3	73.0	75.6	78.3	80.9	82.5	84.1	85.8	87.5	89.2
65+	2.7	2.7	2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.7	3.8	4.0	4.1	4.3	4.4	4.6
Total	204.6	215.2	226.4	237.7	249.5	261.6	273.9	286.7	299.5	312.3	324.8	334.0	342.7	351.8	360.4	368.3
BOTH SEXES	654.9	680.7	707.7	734.9	763.7	792.6	821.9	852.0	885.3	914.6	943.2	970.4	997.1	1024.4	1051.4	1070.8

SOURCES: Based on Table 7.5 and Appendix Table P.2.

TABLE 7.8 -- Labour Force Projections for Alberta by Age and Sex, 1970 to 1985
Series BL: Based on Population Projection Series B

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
MALES																
14-19	43.8	45.5	47.0	48.3	49.5	50.4	51.2	51.8	52.2	51.6	50.5	49.5	48.3	47.0	46.0	46.1
20-24	60.3	63.5	66.7	69.8	72.6	75.5	78.0	80.4	82.4	84.2	85.6	87.3	88.8	90.1	90.9	90.1
25-44	200.7	205.4	210.8	216.6	223.1	230.1	237.8	246.3	255.3	265.0	275.3	286.5	298.1	310.1	322.4	334.7
45-64	130.9	134.0	137.3	140.7	144.2	147.7	150.9	154.1	157.1	159.9	162.6	165.4	168.1	170.7	173.3	175.9
65+	14.6	14.5	14.4	14.3	14.1	14.6	13.9	13.8	13.7	13.6	13.5	13.9	14.6	14.6	14.9	15.3
Total	450.3	462.9	476.2	489.7	503.5	518.3	531.8	546.4	560.7	574.3	587.5	602.6	617.9	632.5	647.5	662.1
FEMALES																
14-19	25.1	26.0	26.9	27.7	28.5	29.2	29.6	30.0	30.1	29.7	28.9	28.2	27.5	26.6	26.1	26.2
20-24	37.7	40.0	42.3	44.5	46.7	48.9	51.3	53.7	56.2	58.6	60.9	62.2	63.3	64.2	64.5	63.8
25-44	85.0	88.7	92.8	97.2	102.0	107.2	112.7	118.6	124.8	131.4	138.4	143.8	149.4	155.2	161.0	166.9
45-64	54.0	56.6	59.2	61.8	64.4	67.0	69.5	72.0	74.5	79.3	79.3	80.7	82.1	83.5	84.9	86.3
65+	2.7	2.7	2.8	2.9	3.0	3.1	3.2	3.4	3.5	3.7	3.7	3.9	4.0	4.2	4.4	45.1
Total	204.6	214.0	224.0	234.1	244.6	255.4	266.3	277.7	289.1	302.7	311.2	318.8	326.3	333.7	340.9	347.7
BOTH SEXES	654.9	676.9	700.2	723.8	748.1	773.7	798.1	824.1	849.8	877.0	898.7	921.4	944.2	976.2	988.4	1009.8

SOURCES: Based on Table 7.5 and Appendix Table P.3.

TABLE 7.9 -- Labour Force Projections for Alberta by Age and Sex, 1970 to 1985
Series CL: Based on Population Projections Series C

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
MALES																
14-19	43.8	45.3	46.7	47.9	48.9	49.7	50.3	50.8	51.0	50.3	49.0	47.8	46.4	44.9	43.6	43.5
20-24	60.3	62.8	65.4	68.0	70.5	72.9	75.2	77.3	79.1	80.7	81.9	83.4	84.7	85.7	86.3	85.2
25-44	200.7	203.9	207.7	211.8	216.3	221.4	227.2	233.5	240.5	248.1	256.4	265.4	275.0	285.0	295.3	305.6
45-64	130.9	133.7	136.8	139.9	143.2	146.3	149.2	152.0	154.6	157.0	159.2	161.5	163.7	165.6	167.5	169.4
65+	14.6	14.4	14.3	14.2	14.1	13.9	13.8	13.7	13.6	13.5	13.3	13.7	14.0	14.4	14.7	15.1
Total	450.3	460.1	470.9	481.8	493.0	504.2	515.7	527.3	538.8	549.6	559.8	571.8	583.8	595.6	607.4	618.8
FEMALES																
14-19	25.1	25.9	26.7	27.5	28.2	28.7	29.1	29.4	29.5	29.0	28.1	27.3	26.5	25.5	24.9	24.8
20-24	37.7	39.6	41.5	43.3	45.2	47.2	49.4	51.7	54.0	56.3	58.3	59.6	60.5	61.2	61.4	60.5
25-44	85.0	88.2	91.7	95.5	99.5	103.9	105.8	113.5	118.7	124.3	130.4	134.8	139.5	144.3	149.3	154.3
45-64	54.0	56.4	58.9	61.4	63.9	66.3	68.7	73.2	73.2	75.5	77.6	78.8	79.9	81.0	82.2	83.3
65+	2.7	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.6	3.7	3.8	4.0	4.1	4.3	4.4
Total	204.6	212.8	221.6	230.6	239.8	249.2	256.2	271.2	278.8	288.7	298.1	304.3	310.4	316.1	322.1	327.3
BOTH SEXES	654.9	672.9	692.5	712.4	732.8	753.4	771.9	798.5	817.6	838.3	857.9	876.1	894.2	911.7	929.5	946.1

SOURCES: Based on Table 7.5 and Appendix Table P.4.

TABLE 7.10 -- Labour Force Projections for Alberta by Age and Sex, 1970 to 1985
Series DL: Based on Population Projections Series D

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
MALES																
14-19	43.8	45.2	46.4	47.4	48.3	48.9	49.5	49.8	49.9	49.0	47.5	46.1	44.4	42.8	41.2	40.7
20-24	60.3	62.2	64.2	66.2	68.2	70.3	72.3	74.2	75.8	77.2	78.3	79.5	80.6	81.4	81.7	80.3
25-44	200.7	202.4	204.5	206.9	209.6	212.8	216.5	220.8	225.7	231.2	237.4	244.4	251.9	259.9	268.2	276.6
45-64	130.9	133.5	136.3	139.2	142.1	144.9	147.5	149.9	152.1	154.1	155.8	157.6	159.2	160.5	161.7	162.8
65+	14.6	14.4	14.3	14.2	14.0	13.9	13.7	13.6	13.5	13.3	13.2	13.5	13.8	14.1	14.5	14.8
Total	450.3	457.7	465.7	473.9	482.2	490.8	499.5	508.3	517.0	524.8	532.2	541.1	549.9	558.7	567.3	575.2
FEMALES																
14-19	25.1	25.8	26.6	27.3	27.9	28.4	28.7	28.9	28.9	28.3	27.3	26.4	25.5	24.4	23.6	23.3
20-24	37.7	39.2	40.7	42.2	43.8	45.6	47.5	49.6	51.8	53.9	55.8	56.9	57.6	58.3	58.2	57.1
25-44	85.0	87.7	90.6	93.7	97.0	100.6	104.3	108.4	112.7	117.3	122.3	125.8	129.6	133.5	137.6	141.6
45-64	54.0	56.3	58.7	61.0	63.3	65.6	67.8	70.0	72.0	74.1	76.0	77.0	77.8	78.7	79.5	80.3
65+	2.7	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.7	3.8	3.9	4.0	4.2	4.3
Total	204.6	211.7	219.4	227.1	235.0	243.3	251.5	260.2	268.8	277.1	285.1	289.9	294.4	298.9	303.1	306.6
BOTH SEXES	654.9	669.4	685.1	701.0	717.2	734.1	751.0	768.5	785.8	801.9	817.3	831.0	844.3	857.6	870.4	881.8

SOURCE: Based on Table 7.5 and Appendix Table P.5.

force would approximate nine thousand. In other words, about two-fifths of the future increase would take place in the female labour force of the province.

Overall, the total labour force of Alberta is anticipated around 774 thousand in 1975 (Series B). The females would number 255 thousand or 33 percent of the total labour force as compared to 31 percent in 1970. This proportion would rise to 35 percent in 1980.

To consider the long term of fifteen years (i.e., 1970 to 1985), the labour force is projected to expand by 355 thousand or 50 percent, and the total size would exceed the mark of one million people. The increase under Series C that assumes no migration would be 227 thousand, or 35 percent. On the average, therefore, the labour force of Alberta may be considered to grow at a rate not less than two percent a year during the next fifteen years.

7.6 Concluding Remarks

The labour force projections presented in this study are based on a less sophisticated methodology. This is partly due to the non-availability of detailed data and the complexity of the field itself. The role of women and their participation in labour force will be the crucial factor in determining the accuracy of these projections. At the same time, the study of the female labour force is even more complex than that of the male, in view of the dual role of women in society. Influences affecting the labour force participation of women, especially married women, call for a detailed study and the census data must be subjected to greater analyses than hitherto at the provincial level.

Needless to say, the foregoing analyses and other labour force studies need more detailed and comprehensive data collected on the basis of standard concepts. From the point of preparing labour force projections for the province, the gap in labour market information is considerable. This applies to some degree to the national scene as well. Looking ahead to the needed statistics for projections, an enlargement of the present labour force survey is imperative. Limiting the burden to a minimum, it may be necessary to consider conducting a supplementary survey by the HRCC at, say, three month intervals in conjunction with the present survey so that the results, combined with DBS sample, will prove adequately representative and reliable to publish quarterly current labour force statistics for the province.

Besides, the present classification of total labour force into ten age groups may be rather limited. The proposed survey should enable a break-down of more detailed age groups, especially for the women, in order to make the projections hereafter on a more detailed study of female activity pattern.

CONCLUDING REMARKS

The population and labour force projections for Alberta to 1985 presented in this report were prepared on the basis of a number of assumptions on the components of population change. Combining one mortality, three fertility and five migration assumptions, fifteen population projections were initially produced. After a detailed evaluation of the fifteen projections, the four series of projections, Series A, Series B, Series C and Series D were selected. From the four series of population projections, the labour force projections were calculated on the basis of the projected participation rates.

The final computations required for preparing the population projections were carried out by the use of an electronic computer. A special computer programme for preparing population projections by the component method was adopted for the present purpose. The programme carried forward the estimated population as of June 1, 1970 in single years of age, by sex to each future year on the basis of certain programmed instructions and input data relating to mortality, fertility and net migration (combining internal and international migration).

In general, the projections are intended to be consistent with the 1966 census counts as tabulated by age and sex, and with the corresponding population estimates for 1970. No adjustment has been made, therefore, for possible net census under enumeration in the population by age and sex.

The four series of population and labour force projections given here offer the user a fairly wide choice of assumptions as to the course of future population changes. It is possible, however, that for some part of the projection period, future population and labour force size will exceed or fall below the range given. Between Series A and Series B the difference in the projected population in 1985 is 496,500, or 22 percent (based on the mean of Series A and Series D population totals. Some may consider this as an impractically wide range. In view of the many uncertainties in predicting future fertility and migration, we do not recommend any one population series as the "best" series. However, Series B and Series C reflect the probable demographic trends in future depending on the prospects of migration.

As mentioned above, the greatest uncertainty in the population projections relates to the projection of births despite the adoption of cohort fertility method. As a consequence, the projections of populations for age cohorts born after the base date of June 1, 1970 are subject to much greater error than those born before the base date. The possibility of error also increases with the length of the projection period. The areas of uncertainty in making fertility projections by birth cohort method lie principally in the assumptions regarding fertility, especially for cohorts not yet born, and its distribution over childbearing ages. There are also certain methodological problems, as mentioned in Chapter IV, in translating cohort fertility rates to period fertility rates. Furthermore, projections of fertility are dependent upon a multitude of social and economic changes that are difficult to foresee.

Another component which is subjected to great uncertainty in the projections is migration. Like fertility, the assumptions about future migration are difficult to make in view of the multiplicity of factors, demographic and non-demographic, that determine the volume and pattern of migration. There might be a change in the volume and/or age composition of migration which could seriously affect the projections.

The quality of labour force projections will depend on the population projections and the participation rates used. The role of women and their participation in labour force will be the crucial factor determining the accuracy of these projections. Additional information is required on the influences affecting the labour force participation of women, especially married women, for making labour force projections based on more solid foundations than attempted here. Furthermore, the labour force projections at the provincial level, like population projections, are affected by the recent trends in internal and international migration, about which the data are inadequate. In view of these, a revision of projections at an interval of three years may be desirable.

APPENDIX TABLES

TABLE P.1 -- Projections of the Population of Alberta according to Various Assumptions of Mortality, Fertility and Migration, 1971, 1975, 1980 and 1985

(Numbers in thousands as of June 1)

Projection No.	Assumption[a]	1971	1975	1980	1985
I	Low fertility and zero migration a year	1620.4	1711.5	1835.6	1965.7
II	Medium fertility and zero migration a year	1621.3	1718.2	1856.3	2008.0
III	High fertility and zero migration a year	1622.0	1724.6	1876.5	2049.6
IV	Low fertility and net migration gain of 22,500 persons a year	1643.0	1831.7	2091.5	2367.3
V	Medium fertility and net migration gain of 22,500 persons a year	1643.9	1838.7	2114.0	2415.1
VI	High fertility and net migration gain of 22,500 persons a year	1644.6	1845.4	2136.0	2462.2
VII	Low fertility and net migration gain of 15,000 persons a year	1635.4	1791.3	2005.5	2232.4
VIII	Medium fertility and net migration gain of 15,000 persons a year	1636.3	1798.2	2027.4	2278.2
IX	High fertility and net migration gain of 15,000 persons a year	1637.0	1804.8	2048.8	2323.4
X	Low fertility and net migration gain of 7,500 persons a year	1627.9	1751.3	1920.4	2098.9
XI	Medium fertility and net migration gain of 7,500 persons a year	1628.8	1758.2	1941.8	2143.0
XII	High fertility and net migration gain of 7,500 persons a year	1629.5	1764.6	1962.6	2186.4
XIII	Low fertility and net migration loss of 5,000 persons a year	1615.4	1685.3	1781.3	1881.3
XIV	Medium fertility and net migration loss of 5,000 persons a year	1616.5	1692.1	1801.8	1922.5
XV	High fertility and net migration loss of 5,000 persons a year	1617.0	1698.4	1821.7	1963.0

[a] All fifteen projections are based on a single mortality assumption. See Chapter 3.

NOTE: Projections VI, VIII, XI and I are called Series A, Series B, Series C and Series D respectively in this report.

SOURCE: Appendix Tables P.1 to P.4.

TABLE P.2 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES
Series A: High Fertility and Net Migration Gain of 22,500 Persons a Year

(Number in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	31.1	33.9	35.7	37.6	39.6	41.7	43.7	45.8	47.8	49.8	51.7	53.5	55.2	56.6	57.8	58.7
1	30.3	31.4	34.2	36.1	38.0	40.0	42.0	44.1	46.1	48.2	50.2	52.1	53.8	55.5	56.9	58.1
2	30.3	30.6	31.9	34.6	36.5	38.5	40.5	42.5	44.5	46.6	48.6	50.6	52.5	54.3	55.9	57.4
3	31.0	30.8	31.1	32.4	35.1	37.0	39.0	40.9	43.0	45.0	47.1	49.1	51.1	53.0	54.8	56.4
4	31.0	31.4	31.3	31.6	32.9	35.6	37.5	39.5	41.5	43.5	45.5	47.6	49.6	51.6	53.5	55.3
0-4	153.7	158.1	164.2	172.3	182.1	192.8	202.7	212.8	222.9	233.1	243.1	252.9	262.2	271.0	278.9	285.9
5	34.0	31.5	31.9	31.8	32.1	33.3	36.1	38.0	39.9	41.9	43.9	46.0	48.1	50.1	52.1	54.0
6	37.4	34.4	32.0	32.4	32.2	32.6	33.8	36.5	38.4	40.4	42.4	44.4	46.4	48.5	50.5	52.5
7	38.2	37.7	34.8	32.4	32.8	32.7	33.0	34.2	37.0	38.9	40.8	42.8	44.8	46.8	48.9	50.9
8	37.9	38.6	38.1	35.2	32.8	33.2	33.0	33.4	34.6	37.3	39.2	41.1	43.2	45.2	47.2	49.3
9	37.5	38.2	38.9	38.4	35.6	33.1	33.5	33.4	33.7	34.9	37.7	39.6	41.5	43.5	45.5	47.6
5-9	185.0	180.4	175.7	170.2	165.5	164.9	169.4	175.5	183.6	193.4	204.0	213.9	224.0	234.1	244.2	254.3
10	37.4	37.8	38.5	39.2	38.8	35.9	33.4	33.8	33.7	34.0	35.3	38.0	39.9	41.8	43.8	45.8
11	37.0	37.6	38.1	38.7	39.5	39.0	36.2	33.7	34.1	34.0	34.3	35.5	38.3	40.2	42.1	44.1
12	36.2	37.2	37.9	38.4	39.0	39.8	39.3	36.5	34.0	34.4	34.3	34.6	35.8	38.6	40.5	42.4
13	35.4	36.5	37.4	38.1	38.6	39.2	40.0	39.5	36.7	34.2	34.6	34.5	34.8	36.0	38.8	40.7
14	34.3	35.6	36.7	37.7	38.4	38.9	39.5	40.3	39.8	37.0	34.5	34.9	34.8	35.1	36.3	39.1
10-14	180.3	184.7	188.6	192.1	194.3	192.8	188.4	183.8	178.3	173.6	173.0	177.5	183.6	191.7	201.5	212.1
15	33.2	34.6	35.9	37.0	37.9	38.7	39.1	39.8	40.6	40.1	37.2	34.8	35.2	35.1	35.4	36.6
16	32.0	33.4	34.9	36.1	37.3	38.2	38.9	39.4	40.0	40.8	40.3	37.5	35.0	35.4	35.3	35.6
17	30.9	32.3	33.7	35.2	36.4	37.6	38.5	39.2	39.7	40.3	41.1	40.6	37.8	35.3	35.7	35.7
18	29.8	31.3	32.7	34.2	35.6	36.8	38.0	38.9	39.6	40.1	40.8	41.5	41.0	38.2	35.8	36.1
19	28.9	30.4	31.8	33.2	34.7	36.1	37.4	38.6	39.5	40.2	40.7	41.3	42.1	41.6	38.8	36.3
15-19	154.8	162.0	169.0	175.7	181.9	187.4	191.9	195.9	199.4	201.5	200.1	195.7	191.1	185.6	181.0	180.3
20	28.0	29.5	31.1	32.5	33.9	35.4	36.8	38.0	39.2	40.1	40.8	41.3	41.9	42.7	42.3	39.4
21	27.1	28.8	30.3	31.9	33.3	34.7	36.1	37.6	38.8	40.0	40.9	41.7	42.2	42.8	43.5	43.1
22	26.1	27.9	29.6	31.2	32.7	34.2	35.6	37.0	38.5	39.7	40.9	41.8	42.5	43.0	43.6	44.4
23	25.2	27.0	28.8	30.5	32.1	33.6	35.1	36.5	37.9	39.3	40.6	41.8	42.7	43.4	43.9	44.5
24	24.2	26.0	27.9	29.7	31.4	32.9	34.5	35.9	37.3	38.8	40.2	41.4	42.6	43.5	44.2	44.7
20-24	130.6	139.2	147.7	155.8	163.4	170.8	178.1	185.0	191.7	197.9	203.4	208.0	211.9	215.4	217.5	216.1
25-29	108.1	115.2	123.1	131.8	140.8	149.8	158.5	166.9	175.0	182.6	190.0	197.2	204.1	210.8	217.0	222.5
30-34	98.4	101.5	105.3	109.8	115.1	121.4	128.5	136.4	145.0	154.0	162.9	171.6	180.0	188.0	195.6	202.9
35-39	98.5	99.6	100.8	102.2	104.0	106.4	109.5	113.3	117.8	123.1	129.3	136.4	144.2	152.8	161.7	170.6
40-44	96.5	98.1	99.5	100.8	101.9	103.0	104.1	105.3	106.7	108.5	110.9	114.0	117.8	122.3	127.6	133.7
45-49	87.4	89.9	92.3	94.5	96.6	98.5	100.2	101.6	102.8	103.9	105.0	106.1	107.3	108.7	110.5	112.9
50-54	75.2	77.5	79.9	82.4	85.0	87.5	90.0	92.3	94.5	96.6	98.5	100.1	101.5	102.7	103.8	104.9
55-59	63.7	65.9	68.0	70.0	72.0	74.1	76.4	78.7	81.2	83.7	86.2	88.5	90.8	93.0	95.0	96.8
60-64	51.5	53.1	55.0	57.1	59.4	61.5	63.6	65.7	67.6	69.5	71.5	73.6	75.9	78.2	80.6	83.0
65-69	41.1	42.5	44.0	45.3	46.6	48.0	49.6	51.4	53.3	55.4	57.4	59.4	61.3	63.1	64.8	66.7
70-74	30.2	31.0	32.1	33.4	34.9	36.3	37.6	38.9	40.1	41.2	42.5	43.9	45.5	47.3	49.1	50.9
75-79	22.0	22.3	22.7	23.2	23.7	24.3	25.0	25.9	27.0	28.2	29.3	30.4	31.5	32.4	33.4	34.5
80-84	14.2	14.5	14.8	14.9	15.0	15.2	15.5	15.7	16.1	16.5	16.9	17.5	18.1	18.9	19.7	20.5
85+	8.8	9.1	9.5	10.0	10.3	10.7	11.0	11.3	11.6	11.8	12.0	12.3	12.6	12.9	13.3	13.6
TOTAL	1600.0	1644.6	1692.2	1741.5	1792.5	1845.4	1900.0	1956.4	2014.6	2074.5	2136.0	2199.0	2263.4	2328.9	2395.2	2462.2

TABLE P.2 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: MALES
Series A: High Fertility and Net Migration Gain of 22,500 Persons a Year -- continued

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.8	17.2	18.2	19.3	20.3	21.3	22.4	23.5	24.5	25.5	26.5	27.4	28.3	29.0	29.6	30.1
1	15.7	16.0	17.5	18.5	19.5	20.5	21.5	22.6	23.7	24.7	25.7	26.7	27.6	28.4	29.2	29.8
2	15.6	15.9	16.2	17.7	18.7	19.7	20.7	21.8	22.8	23.9	24.9	25.9	26.9	27.8	28.7	29.4
3	15.8	15.9	16.1	16.5	18.0	19.0	20.0	21.0	22.0	23.1	24.1	25.2	26.2	27.2	28.1	28.9
4	16.1	16.1	16.1	16.4	16.8	18.3	19.3	20.2	21.3	22.3	23.4	24.4	25.4	26.5	27.4	28.3
0-4	79.0	81.1	84.3	88.4	93.3	98.8	103.9	109.1	114.3	119.5	124.6	129.6	134.4	138.9	143.0	146.5
5	17.4	16.4	16.3	16.4	16.7	17.0	18.5	19.5	20.5	21.5	22.5	23.6	24.7	25.7	26.7	27.7
6	19.3	17.6	16.6	16.6	16.6	16.9	17.3	18.8	19.7	20.7	21.8	22.8	23.8	24.9	25.9	26.9
7	19.5	19.5	17.9	16.8	16.8	16.9	17.1	17.5	19.0	20.0	21.0	22.0	23.0	24.1	25.1	26.2
8	19.4	19.7	19.6	18.1	17.0	17.0	17.1	17.3	17.7	19.2	20.2	21.2	22.2	23.2	24.3	25.3
9	19.1	19.5	19.9	19.8	18.3	17.2	17.2	17.3	17.5	17.9	19.4	20.3	21.4	22.4	23.4	24.5
5-9	94.7	92.7	90.3	87.7	85.4	85.0	87.2	90.4	94.4	99.3	104.9	109.9	115.1	120.3	125.4	130.6
10	19.1	19.2	19.7	20.1	20.0	18.4	17.4	17.3	17.4	17.7	18.0	19.6	20.5	21.5	22.5	23.6
11	18.9	19.2	19.4	19.8	20.2	20.2	18.6	17.6	17.5	17.6	17.8	18.2	19.7	20.7	21.7	22.7
12	18.5	19.0	19.3	19.6	20.0	20.3	20.3	18.7	17.7	17.6	17.7	18.0	18.3	19.9	20.8	21.8
13	18.1	18.7	19.1	19.4	19.7	20.1	20.5	20.4	18.8	17.8	17.8	17.8	18.1	18.5	20.0	20.9
14	17.6	18.2	18.8	19.2	19.6	19.9	20.2	20.6	20.6	19.0	18.0	17.9	18.0	18.2	18.6	20.1
10-14	92.2	94.3	96.3	98.1	99.5	98.9	97.0	94.6	92.0	89.7	89.3	91.5	94.6	98.8	103.6	109.1
15	17.1	17.8	18.4	18.9	19.4	19.7	20.0	20.4	20.8	20.7	19.1	18.1	18.1	18.1	18.4	18.7
16	16.5	17.2	17.9	18.5	19.1	19.5	19.9	20.1	20.5	20.9	20.8	19.3	18.2	18.2	18.3	18.5
17	15.9	16.7	17.4	18.1	18.7	19.2	19.7	20.0	20.3	20.7	21.0	21.0	19.4	18.4	18.3	18.4
18	15.2	16.1	16.9	17.6	18.2	18.9	19.4	19.9	20.2	20.4	20.9	21.2	21.2	19.6	18.6	18.6
19	14.7	15.5	16.3	17.1	17.8	18.5	19.1	19.7	20.1	20.5	20.8	21.1	21.5	21.5	19.9	18.9
15-19	79.4	83.3	86.9	90.2	93.2	95.8	98.1	100.1	101.9	103.2	102.6	100.7	98.4	95.8	93.5	93.1
20	14.1	14.9	15.9	16.7	17.5	18.2	18.8	19.5	20.0	20.5	20.8	21.1	21.5	21.8	21.8	20.2
21	13.6	14.5	15.4	16.3	17.1	17.9	18.6	19.3	19.8	20.4	20.8	21.2	21.5	21.9	22.2	22.2
22	13.0	14.0	14.9	15.8	16.7	17.5	18.3	19.0	19.7	20.3	20.9	21.3	21.6	21.9	22.3	22.7
23	12.5	13.5	14.4	15.4	16.1	17.1	18.0	18.7	19.5	20.1	20.7	21.3	21.7	22.1	22.3	22.7
24	11.9	12.9	13.9	14.9	15.8	16.7	17.6	18.4	19.2	19.9	20.6	21.2	21.7	22.1	22.5	22.8
20-24	65.1	69.8	74.5	79.1	83.3	87.4	91.3	94.9	98.2	101.2	103.8	106.1	108.0	109.8	111.2	110.6
25-29	53.3	57.0	61.1	65.6	70.4	75.2	80.0	84.6	89.1	93.4	97.5	101.3	104.9	108.2	111.2	113.8
30-34	49.6	50.9	52.7	54.8	57.5	60.6	64.3	68.4	72.9	77.6	82.4	87.1	91.8	96.2	100.5	104.6
35-39	51.2	51.6	52.0	52.5	53.1	54.0	55.3	57.1	59.2	61.9	65.0	68.6	72.7	77.2	81.9	86.6
40-44	49.7	50.8	51.7	52.5	53.1	53.6	54.0	54.5	54.9	55.5	56.4	57.8	59.5	61.6	64.2	67.4
45-49	43.7	45.0	46.4	47.9	49.3	50.7	51.8	52.6	53.4	54.0	54.5	54.9	55.4	55.8	56.4	57.3
50-54	38.0	39.0	40.1	41.1	42.2	43.4	44.7	46.1	47.5	48.9	50.2	51.3	52.2	52.9	53.5	54.0
55-59	32.3	33.2	34.2	35.1	35.9	36.9	37.8	38.8	39.9	41.0	42.1	43.3	44.6	46.0	47.3	48.6
60-64	26.4	27.0	27.7	28.6	29.5	30.4	31.3	32.1	33.0	33.8	34.7	35.6	36.5	37.5	38.5	39.6
65-69	21.3	21.9	22.5	22.9	23.3	23.8	24.3	25.0	25.8	26.6	27.4	28.2	29.0	29.7	30.5	31.3
70-74	15.2	15.5	16.0	16.6	17.3	18.0	18.5	19.0	19.4	19.7	20.1	20.6	21.1	21.8	22.5	23.2
75-79	10.8	10.9	11.0	11.1	11.3	11.5	11.8	12.2	12.7	13.2	13.7	14.1	14.5	14.8	15.1	15.4
80-84	7.1	7.1	7.1	7.0	7.0	6.9	7.0	7.1	7.2	7.3	7.5	7.7	7.9	8.2	8.6	8.9
85+	4.1	4.4	4.5	4.7	4.9	5.0	5.0	5.1	5.1	5.2	5.2	5.3	5.4	5.5	5.5	5.7
TOTAL	813.2	835.5	859.3	883.9	909.5	935.9	963.3	991.7	1020.9	1051.0	1081.9	1113.6	1146.0	1179.0	1212.4	1246.2

TABLE P.2 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: FEMALES
Series A: High Fertility and Net Migration Gain of 22,500 Persons a Year -- concluded

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.3	16.5	17.4	18.4	19.4	20.3	21.3	22.3	23.3	24.3	25.2	26.1	26.9	27.6	28.2	28.6
1	14.6	15.4	16.7	17.6	18.5	19.5	20.5	21.5	22.5	23.5	24.5	25.4	26.3	27.0	27.7	28.3
2	14.7	14.8	15.6	16.9	17.8	18.8	19.7	20.7	21.7	22.7	23.7	24.7	25.6	26.5	27.3	28.0
3	15.2	14.9	15.0	15.8	17.1	18.0	19.0	20.0	20.9	21.9	22.9	23.9	24.9	25.8	26.7	27.5
4	14.9	15.4	15.2	15.2	16.1	17.3	18.3	19.2	20.2	21.2	22.2	23.1	24.1	25.1	26.0	26.9
0-4	74.7	77.0	79.9	83.9	88.9	93.9	98.8	103.7	108.6	113.6	118.5	123.2	127.8	132.0	135.9	139.3
5	16.6	15.1	15.6	15.4	15.5	16.3	17.6	18.5	19.4	20.4	21.4	22.4	23.4	24.4	25.3	26.2
6	18.1	16.8	15.4	15.8	15.6	15.7	16.5	17.8	18.7	19.6	20.6	21.6	22.6	23.6	24.6	25.6
7	18.7	18.3	17.0	15.5	16.0	15.8	15.9	16.7	18.0	18.9	19.8	20.8	21.8	22.8	23.8	24.8
8	18.5	18.9	18.4	17.2	15.7	16.2	16.0	16.0	16.9	18.1	19.1	20.0	21.0	22.0	23.0	24.0
9	18.4	18.6	19.0	18.6	17.3	15.9	16.3	16.1	16.2	17.1	18.3	19.2	20.1	21.1	22.1	23.1
5-9	90.3	87.7	85.4	82.5	80.1	79.9	82.3	85.1	89.2	94.1	99.2	104.0	108.9	113.9	118.8	123.7
10	18.3	18.6	18.7	19.2	18.8	17.5	16.1	16.5	16.3	16.4	17.2	18.4	19.4	20.3	21.3	22.3
11	18.1	18.4	18.7	18.9	19.3	18.9	17.6	16.2	16.6	16.4	16.5	17.3	18.6	19.5	20.5	21.4
12	17.7	18.2	18.6	18.8	19.0	19.4	19.0	17.7	16.3	16.8	16.6	16.6	17.4	18.7	19.6	20.6
13	17.3	17.8	18.3	18.7	18.9	19.1	19.6	19.1	17.9	16.4	16.9	16.7	16.7	17.6	18.8	19.7
14	16.7	17.4	18.0	18.4	18.8	19.1	19.2	19.7	19.2	18.0	16.5	17.0	16.8	16.8	17.7	19.0
10-14	88.1	90.4	92.3	94.0	94.8	94.0	91.5	89.2	86.3	84.0	83.7	86.1	88.9	92.9	97.9	103.0
15	16.1	16.8	17.5	18.1	18.6	18.9	19.2	19.4	19.8	19.4	18.1	16.7	17.1	16.9	17.0	17.9
16	15.5	16.2	16.9	17.6	18.2	18.7	19.1	19.3	19.5	19.9	19.5	18.2	16.8	17.2	17.1	17.1
17	15.0	15.6	16.4	17.1	17.8	18.3	18.8	19.2	19.5	19.6	20.1	19.7	18.4	17.0	17.4	17.2
18	14.6	15.2	15.8	16.6	17.3	18.0	18.6	19.1	19.4	19.7	19.9	20.3	19.8	18.6	17.2	17.6
19	14.2	14.9	15.5	16.1	16.8	17.6	18.2	18.8	19.3	19.7	19.9	20.1	20.6	20.1	18.8	17.4
15-19	75.4	78.7	82.1	85.5	88.7	91.5	93.9	95.8	97.5	98.3	97.5	95.0	92.7	89.8	87.5	87.2
20	13.9	14.5	15.2	15.8	16.4	17.2	17.9	18.6	19.2	19.6	20.0	20.2	20.4	20.9	20.4	19.2
21	13.5	14.3	15.0	15.6	16.2	16.8	17.6	18.3	19.0	19.6	20.1	20.4	20.7	20.9	21.3	20.9
22	13.1	14.0	14.7	15.4	16.0	16.7	17.3	18.0	18.8	19.4	20.0	20.5	20.9	21.1	21.3	21.7
23	12.7	13.5	14.4	15.2	15.9	16.5	17.1	17.8	18.5	19.2	19.9	20.5	20.9	21.3	21.6	21.7
24	12.3	13.1	13.9	14.8	15.6	16.2	16.9	17.5	18.0	18.9	19.6	20.3	20.9	21.3	21.7	22.0
20-24	65.5	69.4	73.2	76.8	80.1	83.4	86.8	90.2	93.5	96.7	99.6	101.9	103.8	105.5	106.3	105.5
25-29	54.8	58.2	62.1	66.1	70.4	74.5	78.5	82.3	85.9	89.2	92.5	95.8	99.2	102.6	105.8	108.6
30-34	48.8	50.5	52.6	55.0	57.6	60.7	64.2	68.0	72.1	76.3	80.4	84.4	88.2	91.8	95.1	98.4
35-39	47.3	48.0	48.8	49.7	50.9	52.4	54.2	56.2	58.6	61.3	64.3	67.8	71.6	75.7	79.9	84.0
40-44	46.8	47.3	47.8	48.3	48.8	49.4	50.0	50.8	51.8	53.0	54.5	56.3	58.3	60.7	63.3	66.4
45-49	43.7	44.8	45.8	46.6	47.3	47.9	48.4	48.9	49.4	49.9	50.5	51.2	52.0	52.9	54.1	55.6
50-54	37.2	38.5	39.8	41.3	42.7	44.1	45.2	46.2	47.0	47.7	48.2	48.8	49.3	49.8	50.3	50.9
55-59	31.4	32.7	33.9	35.0	36.1	37.3	38.5	39.9	41.3	42.7	44.1	45.2	46.2	47.0	47.6	48.2
60-64	25.1	26.1	27.3	28.6	29.8	31.1	32.3	33.5	34.6	35.7	36.8	38.1	39.4	40.7	42.2	43.4
65-69	19.8	20.6	21.5	22.4	23.3	24.2	25.3	26.4	27.6	28.8	30.0	31.2	32.3	33.3	34.4	35.4
70-74	15.0	15.5	16.1	16.8	17.5	18.3	19.1	19.9	20.7	21.5	22.4	23.3	24.3	25.4	26.6	27.7
75-79	11.2	11.5	11.7	12.0	12.4	12.8	13.2	13.7	14.3	14.9	15.6	16.3	17.0	17.6	18.3	19.1
80-84	7.1	7.4	7.6	7.9	8.1	8.3	8.5	8.7	8.9	9.2	9.5	9.8	10.2	10.7	11.1	11.6
85+	4.6	4.8	5.0	5.2	5.5	5.7	5.9	6.2	6.4	6.6	6.8	7.0	7.2	7.5	7.7	8.0
TOTAL	786.8	809.1	832.9	857.6	883.0	909.4	936.6	964.7	993.7	1023.5	1054.1	1085.4	1117.3	1149.8	1182.8	1216.0

TABLE P.3 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES
Series B: Medium Fertility and Net Migration Gain of 15,000 Persons a Year

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	31.1	32.9	34.3	35.6	37.0	38.5	39.9	41.4	42.8	44.2	45.5	46.7	47.8	48.6	49.3	49.7
1	30.3	31.2	33.1	34.5	35.8	37.2	38.7	40.1	41.6	43.0	44.4	45.7	46.9	48.0	48.8	49.5
2.	30.3	30.5	31.5	33.4	34.8	36.1	37.5	39.0	40.4	41.9	43.3	44.7	46.0	47.2	48.3	49.1
3	31.0	30.7	30.8	31.9	33.7	35.1	36.5	37.8	39.3	40.7	42.2	43.6	45.0	46.3	47.5	48.6
4	31.0	31.2	31.0	31.1	32.2	34.1	35.4	36.8	38.2	39.6	41.0	42.5	43.9	45.3	46.6	47.8
0-4	153.7	156.5	160.7	166.5	173.5	181.0	188.0	195.1	202.3	209.4	216.4	223.2	229.6	235.4	240.5	244.7
5	34.0	31.4	31.5	31.3	31.4	32.5	34.4	35.7	37.1	38.5	39.9	41.3	42.8	44.2	45.6	46.9
6	37.4	34.3	31.7	31.9	31.6	31.7	32.8	34.7	36.0	37.4	38.8	40.2	41.6	43.1	44.5	45.9
7	38.2	37.6	34.6	31.9	32.1	31.9	32.0	33.1	34.9	36.3	37.7	39.1	40.5	41.9	43.4	44.8
8	37.9	38.4	37.8	34.8	32.2	32.4	32.1	32.2	33.3	25.2	36.5	37.9	39.3	40.7	42.1	43.6
9	37.5	38.0	38.7	38.0	35.1	32.4	32.6	32.3	32.5	33.5	35.4	36.8	38.1	39.6	41.0	42.4
5-9	185.0	179.7	174.3	167.9	162.4	160.9	163.9	168.0	173.8	180.9	188.3	195.3	202.3	209.5	216.6	223.6
10	37.4	37.7	38.2	38.9	38.2	35.3	32.6	32.8	32.6	32.7	33.8	35.6	37.0	38.3	39.8	41.2
11	37.0	37.5	37.9	38.4	39.1	38.4	35.4	32.8	33.0	32.8	32.9	33.9	35.8	37.1	38.5	39.9
12	36.2	37.1	37.7	38.1	39.6	39.2	38.6	35.6	33.0	33.2	32.9	33.1	34.1	36.0	37.3	38.7
13	35.4	36.4	37.2	37.8	38.2	38.8	39.4	38.8	35.8	33.1	33.3	33.1	33.2	34.3	36.2	37.5
14	34.3	35.5	36.6	37.4	38.0	38.4	38.9	39.5	38.9	35.9	33.3	33.5	33.3	33.4	34.4	36.3
10-14	180.3	184.2	187.6	190.6	192.1	190.1	184.9	179.5	173.3	167.7	166.2	169.2	173.4	179.1	186.2	193.6
15	33.2	34.5	35.7	36.7	37.6	38.2	38.6	39.1	39.7	39.1	36.1	33.5	33.7	33.4	33.5	34.6
16	32.0	33.3	34.7	35.8	36.9	37.7	38.4	38.7	39.3	39.9	39.3	36.3	33.6	33.9	33.6	33.8
17	30.9	32.2	33.5	34.9	36.0	37.1	37.9	38.6	39.0	39.4	40.1	39.5	36.5	33.9	34.1	33.8
18	29.8	31.1	32.4	33.8	35.1	36.3	37.4	38.2	38.8	39.2	39.7	40.3	39.7	36.7	34.1	34.3
19	28.9	30.2	31.5	32.8	34.2	35.5	36.6	37.7	38.5	39.2	39.5	40.0	40.7	40.1	37.1	34.5
15-19	154.8	161.3	167.8	174.0	179.8	184.8	188.9	192.3	195.3	196.8	194.7	189.6	184.2	178.0	172.4	171.0
20	28.0	29.3	30.6	31.9	33.2	34.6	35.9	37.1	38.1	38.9	39.6	40.0	40.5	41.1	40.5	37.5
21	27.1	28.5	29.8	31.2	32.5	33.8	35.1	36.4	37.6	38.7	39.5	40.1	40.5	41.0	41.6	41.0
22	26.1	27.6	29.1	30.4	31.7	33.0	34.3	35.7	37.0	38.2	39.2	40.1	40.7	41.1	41.6	42.2
23	25.2	26.7	28.2	29.6	31.0	32.3	33.6	34.9	36.3	37.6	38.8	39.8	40.6	41.2	41.7	42.2
24	24.2	25.7	27.3	28.8	30.2	31.5	32.9	34.1	35.4	36.8	38.1	39.3	40.4	41.2	41.8	42.2
20-24	130.6	137.8	145.0	151.9	158.6	165.2	171.8	178.2	184.4	190.2	195.2	199.3	202.7	205.6	207.2	205.1
25-29	108.1	114.0	120.7	128.0	135.5	143.1	150.4	157.5	164.4	171.1	177.7	184.2	190.6	196.9	202.6	207.6
30-34	98.4	100.6	103.5	107.0	111.4	116.5	122.4	129.1	136.3	143.9	151.4	158.7	165.8	172.6	179.3	185.8
35-39	98.5	99.1	99.8	100.6	101.7	103.3	105.6	108.5	112.0	116.3	121.5	127.4	134.0	141.2	148.7	156.2
40-44	96.5	97.8	98.9	99.8	100.5	101.1	101.8	102.5	103.3	104.4	106.1	108.4	111.2	114.7	119.0	124.1
45-49	87.4	89.7	91.8	93.9	95.7	97.3	98.7	99.8	100.7	101.4	102.0	102.6	103.4	104.2	105.3	106.9
50-54	[illegible]	77.4	79.7	82.1	84.5	86.9	89.2	91.3	93.3	95.1	96.7	98.0	99.1	100.0	100.7	101.3
55-59	63.7	65.8	67.8	69.7	71.6	73.5	75.6	77.9	80.2	82.6	84.9	87.2	89.2	91.2	92.9	94.5
60-64	51.5	53.0	54.8	56.8	58.9	61.0	63.0	64.9	66.7	68.5	70.4	72.4	74.6	76.8	79.1	81.3
65-69	41.1	42.5	43.8	45.0	46.3	47.6	49.1	50.8	52.6	54.6	56.5	58.4	60.1	61.8	63.5	65.3
70-74	30.2	31.0	32.0	33.3	34.6	36.0	37.2	38.4	39.6	40.6	41.8	43.2	44.7	46.3	48.1	49.8
75-79	22.0	22.3	22.6	23.0	23.6	24.1	24.8	25.7	26.7	27.8	28.9	29.9	30.9	31.9	32.8	33.8
80-84	14.2	14.5	14.7	14.9	15.0	15.1	15.4	15.6	15.9	16.3	16.7	17.2	17.9	18.6	19.4	20.1
85+	8.8	9.1	9.5	9.9	10.3	10.7	11.0	11.3	11.5	11.7	12.0	12.2	12.5	12.8	13.1	13.5
TOTAL	1600.0	1636.3	1675.0	1714.9	1756.0	1798.2	1841.7	1886.4	1932.3	1979.3	2027.4	2076.4	2126.2	2176.6	2227.4	2278.2

TABLE P.3 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: MALES
Series B: Medium Fertility and Net Migration Gain of 15,000 Persons a Year -- continued

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.8	16.9	17.5	18.3	19.0	19.7	20.4	21.2	21.9	22.7	23.3	23.9	24.5	24.9	25.3	25.5
1	15.7	15.9	17.0	17.7	18.3	19.1	19.8	20.5	21.3	22.0	22.8	23.4	24.0	24.6	25.0	25.3
2	15.6	15.8	16.1	17.1	17.8	18.5	19.2	20.0	20.7	21.4	22.2	22.9	23.6	24.2	24.7	25.2
3	15.8	15.8	15.9	16.2	17.3	18.0	18.7	19.4	20.1	20.9	21.6	22.4	23.1	23.7	24.4	24.9
4	16.1	16.0	16.0	16.1	16.4	17.4	18.2	18.9	19.6	20.3	21.0	21.8	22.5	23.2	23.9	24.5
0-4	79.0	80.2	82.5	85.4	88.8	92.7	96.3	100.0	103.6	107.3	110.9	114.4	117.7	120.6	123.3	125.4
5	17.4	16.3	16.1	16.1	16.3	16.6	17.6	18.3	19.0	19.7	20.5	21.2	21.9	22.7	23.4	24.1
6	19.3	17.5	16.4	16.3	16.3	16.4	16.7	17.8	18.5	19.2	19.9	20.6	21.3	22.1	22.8	23.5
7	19.5	19.4	17.7	16.6	16.4	16.4	16.6	16.9	17.9	18.6	19.3	20.0	20.8	21.5	22.3	23.0
8	19.4	19.6	19.5	17.9	16.7	16.6	16.6	16.7	17.0	18.1	18.7	19.5	20.2	20.9	21.6	22.4
9	19.1	19.5	19.8	19.6	18.0	16.8	16.7	16.7	16.9	17.1	18.2	18.9	19.6	20.3	21.0	21.7
5-9	94.7	92.3	89.5	86.5	83.7	82.8	84.2	86.4	89.3	92.7	96.6	100.2	103.8	107.5	111.1	114.7
10	19.1	19.3	19.6	19.8	19.7	18.1	17.0	16.8	16.8	17.0	17.2	18.3	19.0	19.7	20.4	21.1
11	18.9	19.1	19.3	19.7	19.9	19.8	18.2	17.0	16.9	16.9	17.0	17.3	18.4	19.1	19.8	20.5
12	18.5	18.9	19.2	19.4	19.8	20.0	19.9	18.3	17.1	17.0	17.0	17.1	17.4	18.5	19.1	19.9
13	18.1	18.6	19.0	19.3	19.5	19.9	20.1	20.0	18.4	17.2	17.1	17.1	17.2	17.5	18.6	19.2
14	17.6	18.2	18.7	19.1	19.4	19.6	19.9	20.2	20.1	18.4	17.3	17.2	17.2	17.3	17.6	18.7
10-14	92.2	94.1	95.8	97.3	98.3	97.4	95.1	92.3	89.3	86.5	85.6	87.0	89.2	92.1	95.5	99.4
15	17.1	17.7	18.2	18.8	19.2	19.5	19.7	20.0	20.3	20.2	18.5	17.4	17.2	17.3	17.4	17.7
16	16.5	17.2	17.8	18.3	18.9	19.2	19.6	19.7	20.1	20.4	20.3	18.6	17.5	17.3	17.4	17.5
17	15.9	16.6	17.3	17.9	18.4	19.0	19.3	19.7	19.9	20.2	20.5	20.4	18.7	17.6	17.4	17.4
18	15.2	16.0	16.7	17.4	18.0	18.6	19.1	19.5	19.8	20.0	20.3	20.6	20.5	18.8	17.7	17.6
19	14.7	15.4	16.2	16.9	17.6	18.2	18.7	19.3	19.6	19.9	20.2	20.5	20.8	20.7	19.0	17.9
15-19	79.4	82.9	86.2	89.3	92.1	94.5	96.4	98.2	99.7	100.7	99.8	97.5	94.7	91.7	88.9	88.1
20	14.1	14.9	15.7	16.4	17.1	17.8	18.4	19.0	19.5	19.9	20.1	20.4	20.7	21.0	20.9	19.3
21	13.6	14.3	15.1	15.9	16.6	17.3	18.0	18.7	19.2	19.7	20.1	20.4	20.6	21.0	21.2	21.1
22	13.0	13.8	14.6	15.4	16.2	16.9	17.6	18.3	18.9	19.5	20.0	20.4	20.7	20.9	21.2	21.5
23	12.5	13.3	14.1	14.9	15.7	16.5	17.2	17.9	18.6	19.2	19.8	20.3	20.7	21.0	21.2	21.5
24	11.9	12.8	13.6	14.4	15.2	16.0	16.8	17.5	18.2	18.9	19.5	20.0	20.6	20.9	21.3	21.5
20-24	65.1	69.1	73.1	77.0	80.8	84.5	88.0	91.4	94.4	97.2	99.5	101.5	103.3	104.8	105.8	104.9
25-29	53.3	56.3	59.7	63.5	67.6	71.6	75.7	79.6	83.5	87.3	91.0	94.5	97.8	100.9	103.6	106.0
30-34	49.6	50.5	51.8	53.4	55.5	58.0	61.0	64.4	68.2	72.2	76.3	80.3	84.2	88.1	91.9	95.5
35-39	51.2	51.3	51.5	51.6	51.9	52.4	53.3	54.6	56.2	58.3	60.8	63.8	67.2	70.9	74.9	78.9
40-44	49.7	50.6	51.4	51.9	52.3	52.6	52.7	52.9	53.0	53.3	53.8	54.7	56.0	57.6	59.7	62.2
45-49	43.7	44.9	46.2	47.5	48.8	50.0	51.0	51.7	52.2	52.6	52.8	53.0	53.2	53.3	53.6	54.1
50-54	38.0	39.0	39.9	41.0	42.0	43.1	44.3	45.6	46.9	48.1	49.3	50.2	50.9	51.4	51.8	52.1
55-59	32.3	33.2	34.1	34.9	35.7	36.6	37.5	38.5	39.5	40.5	41.5	42.7	43.9	45.1	46.4	47.5
60-64	26.4	26.9	27.6	28.5	29.3	30.2	31.0	31.8	32.6	33.4	34.2	35.1	36.0	36.9	37.8	38.8
65-69	21.3	21.9	22.4	22.8	23.2	23.6	24.1	24.7	25.5	26.3	27.1	27.8	28.6	29.3	30.0	30.7
70-74	15.2	15.5	16.0	16.6	17.2	17.9	18.4	18.8	19.2	19.5	19.9	20.3	20.8	21.5	22.1	22.8
75-79	10.8	10.9	11.0	11.1	11.3	11.5	11.8	12.1	12.6	13.1	13.6	13.9	14.3	14.6	14.8	15.1
80-84	7.1	7.1	7.1	7.0	6.9	6.9	7.0	7.0	7.1	7.2	7.4	7.6	7.8	8.1	8.5	8.8
85+	4.2	4.4	4.5	4.7	4.9	5.0	5.1	5.1	5.1	5.2	5.2	5.3	5.3	5.4	5.5	5.6
TOTAL	813.2	831.1	850.3	870.0	890.3	911.3	932.9	955.1	977.9	1001.4	1025.3	1049.8	1074.7	1099.8	1125.2	1150.6

Series B: Medium Fertility and Net Migration Gain of 15,000 Persons a Year -- Concluded

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.3	16.1	16.7	17.4	18.1	18.8	19.5	20.2	20.9	21.6	22.2	22.8	23.3	23.7	24.0	24.2
1	14.6	15.3	16.2	16.8	17.5	18.1	18.9	19.6	20.3	21.0	21.6	22.3	22.9	23.4	23.8	24.1
2	14.7	14.7	15.5	16.3	16.9	17.6	18.3	19.0	19.7	20.4	21.1	21.8	22.4	23.0	23.5	24.0
3	15.2	14.9	14.8	15.6	16.4	17.1	17.8	18.4	19.1	19.8	20.6	21.2	22.0	22.6	23.2	23.7
4	14.9	15.3	15.0	15.0	15.8	16.6	17.2	17.9	18.6	19.3	20.0	20.7	21.4	22.1	22.7	23.3
0-4	74.7	76.3	78.2	81.1	84.7	88.2	91.7	95.1	98.6	102.1	105.5	108.8	112.0	114.8	117.2	119.3
5	16.6	15.1	15.4	15.2	15.1	15.9	16.7	17.4	18.1	18.8	19.5	20.1	20.8	21.6	22.2	22.9
6	18.1	16.7	15.2	15.6	15.3	15.3	16.1	16.9	17.5	18.2	18.9	19.6	20.3	21.0	21.7	22.4
7	18.7	18.2	16.9	15.3	15.7	15.4	15.4	16.2	17.0	17.7	18.3	19.0	19.7	20.4	21.1	21.8
8	18.5	18.8	18.3	17.0	15.5	15.8	15.6	15.5	16.3	17.1	17.8	18.5	19.1	19.8	20.5	21.2
9	18.4	18.5	18.9	18.4	17.1	15.6	15.9	15.7	15.7	16.4	17.2	17.9	18.6	19.2	20.0	20.6
5-9	90.3	87.3	84.7	81.5	78.7	78.0	79.7	81.7	84.6	88.2	91.7	95.1	98.5	102.0	105.5	108.9
10	18.3	18.5	18.6	19.0	18.5	17.2	15.7	16.0	15.8	15.7	16.5	17.3	18.0	18.6	19.3	20.1
11	18.1	18.4	18.6	18.7	19.1	18.6	17.2	15.8	16.1	15.9	15.8	16.6	17.4	18.1	18.7	19.4
12	17.7	18.2	18.5	18.7	18.8	19.2	18.7	17.3	15.9	16.2	15.9	15.9	16.7	17.5	18.2	18.8
13	17.3	17.8	18.2	18.6	18.8	18.9	19.2	18.8	17.4	15.9	16.3	16.0	16.0	16.7	17.6	18.2
14	16.7	17.3	17.9	18.3	18.6	18.8	19.0	19.3	18.8	17.5	16.0	16.4	16.1	16.1	16.8	17.7
10-14	88.1	90.2	91.8	93.3	93.8	92.7	89.8	87.2	84.0	81.2	80.5	82.2	84.2	87.0	90.6	94.2
15	16.1	16.8	17.4	17.9	18.4	18.7	18.9	19.1	19.4	18.9	17.6	16.1	16.4	16.2	16.1	16.9
16	15.5	16.2	16.9	17.5	18.0	18.5	18.8	19.0	19.2	19.5	19.0	17.7	16.2	16.5	16.3	16.2
17	15.0	15.6	16.2	17.0	17.6	18.1	18.6	18.9	19.1	19.3	19.6	19.1	17.8	16.3	16.6	16.4
18	14.6	15.1	15.8	16.4	17.1	17.7	18.3	18.7	19.0	19.2	19.4	19.7	19.2	17.9	16.4	16.8
19	14.2	14.7	15.3	15.9	16.6	17.3	17.9	18.4	18.9	19.2	19.4	19.5	19.9	19.4	18.1	16.6
15-19	75.4	78.4	81.6	84.7	87.7	90.3	92.5	94.1	95.6	96.1	95.0	92.1	89.5	86.3	83.5	82.9
20	13.9	14.4	15.0	15.5	16.1	16.8	17.5	18.1	18.7	19.1	19.4	19.6	19.8	20.1	19.6	18.3
21	13.5	14.1	14.7	15.3	15.8	16.4	17.0	17.8	18.4	18.9	19.4	19.7	19.9	20.0	20.4	19.9
22	13.1	13.8	14.4	15.0	15.5	16.1	16.7	17.3	18.1	18.7	19.2	19.7	20.0	20.2	20.3	20.7
23	12.7	13.4	14.1	14.7	15.3	15.8	16.4	17.0	17.6	18.4	19.0	19.5	19.9	20.3	20.5	20.6
24	12.3	13.0	13.7	14.4	15.0	15.6	16.1	16.6	17.2	17.9	18.6	19.2	19.8	20.2	20.6	20.7
20-24	65.5	68.7	71.9	74.9	77.7	80.7	83.7	86.8	90.0	93.0	95.6	97.7	99.4	100.8	101.4	100.2
25-29	54.8	57.7	61.0	64.4	68.0	71.4	74.7	77.9	80.8	83.7	86.6	89.7	92.8	96.0	99.0	101.6
30-34	48.8	50.1	51.8	53.6	55.9	58.5	61.4	64.7	68.1	71.7	75.1	78.4	81.6	84.5	87.4	90.3
35-39	47.3	47.8	48.3	49.0	49.9	51.0	52.3	54.0	55.8	58.1	60.7	63.6	66.8	70.3	73.8	77.3
40-44	46.8	47.2	47.5	47.9	48.2	48.6	49.0	49.6	50.3	51.1	52.3	53.6	55.2	57.1	59.3	61.9
45-49	43.7	44.7	45.7	46.3	46.9	47.3	47.7	48.1	48.4	48.8	49.2	49.6	50.2	50.9	51.8	52.8
50-54	37.2	38.4	39.7	41.1	42.5	43.8	44.9	45.7	46.4	46.9	47.4	47.8	48.2	48.5	48.9	49.3
55-59	31.4	32.6	33.7	34.8	35.8	36.9	38.1	39.4	40.8	42.1	43.4	44.5	45.3	46.0	46.6	47.0
60-64	25.1	26.1	27.2	28.4	29.6	30.8	32.0	33.0	34.1	35.1	36.2	37.3	38.6	39.9	41.3	42.5
65-69	19.8	20.6	21.4	22.2	23.1	24.0	25.0	26.0	27.1	28.3	29.4	30.6	31.6	32.6	33.5	34.6
70-74	15.0	15.5	16.0	16.7	17.4	18.1	18.9	19.6	20.4	21.1	22.0	22.9	23.8	24.9	25.9	27.0
75-79	11.2	11.4	11.7	12.0	12.3	12.7	13.1	13.6	14.1	14.7	15.3	16.0	16.6	17.3	18.0	18.6
80-84	7.1	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.1	9.4	9.7	10.1	10.5	10.9	11.4
85+	4.6	4.8	5.0	5.2	5.4	5.7	5.9	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.9
TOTAL	786.8	805.2	824.8	844.9	865.6	886.9	908.8	931.3	954.3	977.9	1002.1	1026.6	1051.6	1076.8	1102.2	1127.7

TABLE P.4 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES
Series C: Low Fertility and Net Migration Gain of 7,500 Persons a Year

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	31.1	32.7	33.8	34.9	36.1	37.3	38.4	39.7	40.9	42.1	43.2	44.2	45.1	45.8	46.3	46.5
1	30.3	31.1	32.8	33.9	35.0	36.1	37.3	38.5	39.7	40.9	42.1	43.2	44.3	45.2	45.8	46.3
2	30.3	30.3	31.2	32.9	34.0	35.1	36.3	37.4	38.6	39.9	41.1	42.3	43.4	44.4	45.3	45.9
3	31.0	30.5	30.5	31.4	33.1	34.2	35.3	36.4	37.6	38.8	40.0	41.2	42.4	43.5	44.5	45.4
4	31.0	31.1	30.6	30.6	31.5	33.2	34.3	35.4	36.6	37.7	38.9	40.2	41.4	42.5	43.6	44.7
0-4	153.7	155.7	158.9	16.37	169.7	175.9	181.6	187.4	193.4	199.4	205.3	211.1	216.5	221.4	225.5	228.8
5	34.0	31.2	31.2	30.8	30.8	31.6	33.4	34.5	35.6	36.7	37.9	39.0	40.3	41.5	42.7	43.8
6	37.4	34.1	31.3	31.4	30.9	30.9	31.8	33.5	34.6	35.7	36.9	38.0	39.2	40.4	41.6	42.8
7	38.2	37.4	34.3	31.5	31.5	31.1	31.1	31.9	33.7	34.7	35.8	37.0	38.1	39.3	40.6	41.8
8	37.9	38.3	37.6	34.4	31.6	31.6	31.2	31.2	32.0	33.8	34.9	36.0	37.1	38.3	39.5	40.7
9	37.5	37.9	38.4	37.6	34.5	31.7	31.7	31.3	31.3	32.2	33.9	35.0	36.1	37.2	38.4	39.5
5-9	185.0	178.9	172.8	165.7	159.3	156.9	159.2	162.4	167.2	173.1	179.4	185.0	190.8	196.7	202.7	208.6
10	37.4	37.6	38.0	38.5	37.7	34.6	31.8	31.8	31.4	31.4	32.3	34.0	35.1	36.2	37.3	38.5
11	37.0	37.5	37.7	38.1	38.6	37.8	34.7	31.9	31.9	31.5	31.4	32.4	34.1	35.1	36.3	37.4
12	36.2	37.0	37.5	37.8	38.2	38.7	37.9	34.8	32.0	32.0	31.6	31.5	32.5	34.2	35.2	36.4
13	35.4	36.3	37.1	37.6	37.9	38.2	38.7	38.0	34.8	32.0	32.1	31.6	31.6	32.5	34.3	35.3
14	34.3	35.4	36.4	37.1	37.6	38.0	38.3	38.8	38.1	34.9	32.1	32.2	31.7	31.7	32.6	34.3
10-14	180.3	183.8	186.7	189.1	190.0	187.3	181.4	175.3	168.2	161.8	159.5	161.7	165.0	169.7	175.7	181.9
15	33.2	34.4	35.5	36.5	37.2	37.7	38.0	38.4	38.9	38.1	35.0	32.2	32.2	31.8	31.8	32.7
16	32.0	33.2	34.5	35.6	36.5	37.3	37.8	38.1	38.4	39.0	38.2	35.0	32.3	32.3	31.9	31.9
17	30.9	32.1	33.3	34.5	35.6	36.6	37.4	37.9	38.2	38.5	39.1	38.3	35.2	32.4	32.4	32.0
18	29.8	31.0	32.2	33.4	34.7	35.8	36.7	37.4	38.0	38.3	38.6	39.2	38.4	35.3	32.5	32.5
19	28.9	30.0	31.1	32.3	33.6	34.8	35.9	36.9	37.6	38.2	38.4	38.8	39.3	38.5	35.4	32.6
15-19	154.8	160.7	166.6	172.3	177.6	182.2	185.8	188.7	191.1	192.1	189.3	183.5	177.4	170.3	164.0	161.7
20	28.0	29.1	30.2	31.4	32.5	33.8	35.0	36.1	37.1	37.8	38.3	38.6	39.0	39.5	38.7	35.6
21	27.1	28.2	29.3	30.4	31.6	32.8	34.0	35.3	36.3	37.4	38.1	38.6	38.9	39.3	39.8	39.0
22	26.1	27.3	28.5	29.6	30.7	31.8	33.1	34.3	35.5	36.6	37.6	38.3	38.8	39.1	39.5	40.0
23	25.2	26.4	27.6	28.7	29.9	31.0	32.1	33.3	34.6	35.8	36.9	37.9	38.6	39.1	39.4	39.8
24	24.2	25.4	26.6	27.9	29.0	30.1	31.3	32.4	33.6	34.8	36.0	37.1	38.1	38.9	39.4	39.7
20-24	130.6	136.4	142.2	148.0	153.7	159.5	165.5	171.4	177.1	182.4	186.9	190.5	193.4	195.9	196.8	194.1
25-29	108.1	112.8	118.2	124.1	130.3	136.4	142.3	148.1	153.8	159.5	165.4	171.3	177.2	182.9	188.1	192.7
30-34	98.4	99.9	102.0	104.6	107.9	112.0	116.7	122.1	128.0	134.1	140.2	146.1	151.9	157.6	163.2	169.0
35-39	98.5	98.6	98.8	99.1	99.6	100.5	102.1	104.1	106.8	110.1	114.1	118.9	124.2	130.1	136.2	142.2
40-44	96.5	97.5	98.3	98.8	99.1	99.3	99.5	99.7	100.0	100.5	101.4	103.0	105.1	107.7	111.0	115.0
45-49	87.4	89.5	91.4	93.2	94.8	96.2	97.2	98.0	98.5	98.8	99.0	99.2	99.4	99.7	100.2	101.2
50-54	75.2	77.2	79.4	81.6	83.9	86.1	88.1	90.1	91.8	93.4	94.7	95.8	96.5	97.0	97.4	97.6
55-59	63.7	65.7	67.5	69.3	71.1	72.9	74.9	77.0	79.2	81.4	83.5	85.5	87.4	89.1	90.7	92.0
60-64	51.5	52.9	54.6	56.5	58.5	60.5	62.3	64.1	65.8	67.5	69.3	71.2	73.2	75.3	77.4	79.4
65-69	41.1	42.4	43.6	44.8	45.9	47.2	48.6	50.1	51.9	53.8	55.6	57.3	59.0	60.6	62.3	63.8
70-74	30.2	30.9	31.9	33.1	34.4	35.7	36.9	38.0	39.0	40.1	41.2	42.4	43.8	45.4	47.1	48.7
75-79	22.0	22.3	22.6	23.0	23.4	24.0	24.6	25.5	26.4	27.4	28.5	29.5	30.4	31.3	32.1	33.1
80-84	14.2	14.5	14.7	14.8	14.9	15.0	15.3	15.5	15.8	16.1	16.6	17.0	17.6	18.3	19.0	19.8
85+	8.8	9.1	9.5	9.9	10.3	10.6	10.9	11.2	11.5	11.7	11.9	12.2	12.4	12.7	13.0	13.4
TOTAL	1600.0	1628.8	1659.7	1691.6	1724.4	1758.2	1792.9	1828.7	1865.5	1903.2	1941.8	1981.2	2021.2	2061.7	2102.4	2143.0

Series C: Low Fertility and Net Migration Gain of 7,500 Persons a Year -- continued

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.8	16.8	17.3	17.9	18.5	19.1	19.7	20.3	21.0	21.6	21.1	22.7	23.1	23.5	23.7	23.8
1	15.7	15.8	16.8	17.3	17.9	18.5	19.1	19.7	20.3	21.0	21.6	22.1	22.7	23.1	23.5	23.7
2	15.6	15.7	15.9	16.9	17.4	18.0	18.6	19.2	19.8	20.4	21.0	21.6	22.2	22.7	23.2	23.5
3	15.8	15.7	15.7	16.0	17.0	17.5	18.0	18.6	19.2	19.8	20.5	21.1	21.7	22.3	22.8	23.3
4	16.1	15.8	15.8	15.8	16.0	17.0	17.6	18.1	18.7	19.3	19.9	20.6	21.2	21.8	22.3	22.9
0-4	79.0	79.8	81.5	83.9	86.8	90.1	93.0	96.0	99.0	102.1	105.1	108.1	110.9	113.4	115.5	117.2
5	17.4	16.2	15.9	15.9	15.9	16.1	17.1	17.7	18.2	18.8	19.4	20.0	20.6	21.3	21.9	22.4
6	19.3	17.5	16.3	16.0	15.9	16.0	16.2	17.2	17.7	18.3	18.9	19.5	20.1	20.7	21.3	21.9
7	19.5	19.3	17.5	16.3	16.1	16.0	16.1	16.3	17.3	17.8	18.4	19.0	19.6	20.1	20.8	21.4
8	19.4	19.5	19.4	17.6	16.4	16.1	16.1	16.1	16.3	17.3	17.8	18.4	19.0	19.6	20.2	20.9
9	19.1	19.4	19.6	19.4	17.7	16.5	16.2	16.1	16.2	16.4	17.4	17.9	18.5	19.1	19.7	20.3
5-9	94.7	91.9	88.7	85.2	82.0	80.7	81.7	83.4	85.7	88.6	91.9	94.8	97.8	100.8	103.9	106.9
10	19.1	19.2	19.5	19.7	19.5	17.7	16.5	16.3	16.2	16.3	16.4	17.4	18.0	18.6	19.1	19.7
11	18.9	19.1	19.2	19.5	19.7	19.5	17.8	16.6	16.3	16.2	16.3	16.5	17.5	18.0	18.6	19.2
12	18.5	18.8	19.1	19.3	19.5	19.8	19.6	17.8	16.6	16.4	16.3	16.4	16.5	17.5	18.1	18.6
13	18.1	18.6	18.9	19.1	19.3	19.6	19.8	19.6	17.9	16.6	16.4	16.3	16.4	16.6	17.6	18.1
14	17.6	18.1	18.6	18.9	19.2	19.3	19.6	19.8	19.6	17.9	16.7	16.4	16.3	16.4	16.6	17.6
10-14	92.2	93.8	95.3	96.5	97.2	95.9	93.3	90.1	86.6	83.4	82.1	83.0	84.7	87.1	90.0	93.2
15	17.1	17.7	18.2	18.7	19.0	19.2	19.4	19.7	19.9	19.7	17.9	16.7	16.5	16.4	16.5	16.7
16	16.5	17.1	17.7	18.2	18.9	19.0	19.2	19.4	19.7	19.9	19.7	18.0	16.8	16.5	16.4	16.5
17	15.9	16.6	17.1	17.7	18.2	18.9	19.0	19.3	19.4	19.7	19.9	19.7	18.0	16.8	16.6	16.5
18	15.2	15.9	16.6	17.2	17.8	18.3	18.8	19.1	19.3	19.5	19.8	20.0	19.8	18.0	16.8	16.6
19	14.7	15.3	16.0	16.7	17.3	17.9	18.4	18.8	19.2	19.4	19.6	19.9	20.0	19.9	18.1	16.9
15-19	79.4	82.6	85.6	88.5	90.0	93.1	94.8	96.3	97.5	98.2	96.9	94.3	91.1	87.6	84.4	83.2
20	14.1	14.7	15.4	16.1	16.7	17.4	17.9	18.4	18.9	19.2	19.5	19.7	19.9	20.1	19.9	18.2
21	13.6	14.2	14.9	15.5	16.2	16.9	17.5	18.1	18.6	19.0	19.4	19.6	19.8	20.1	20.3	20.1
22	13.0	13.7	14.3	15.0	15.7	16.3	17.0	17.6	18.2	18.7	19.2	19.5	19.7	19.9	20.2	20.4
23	12.5	13.1	13.8	14.5	15.1	15.8	16.5	17.1	17.7	18.3	18.8	19.3	19.6	19.9	20.0	20.3
24	11.9	12.6	13.3	13.9	14.6	15.2	15.9	16.6	17.3	17.9	18.4	18.9	19.4	19.7	20.0	20.1
20-24	65.1	68.3	71.7	75.0	78.3	81.6	84.8	87.8	90.7	93.1	95.3	97.0	98.5	99.7	100.4	99.1
25-29	53.3	55.6	58.4	61.4	64.7	68.0	71.3	74.6	78.0	81.3	84.6	87.7	90.7	93.5	96.0	98.2
30-34	49.6	50.1	50.9	52.0	53.5	55.5	57.8	60.5	63.5	66.8	70.1	73.4	76.7	80.0	83.3	86.5
35-39	51.2	51.0	50.9	50.7	50.6	50.8	51.3	52.1	53.2	54.7	56.6	58.9	61.6	64.7	67.9	71.2
40-44	49.7	50.5	51.0	51.4	51.5	51.5	51.4	51.3	51.1	51.0	51.2	51.7	52.5	53.6	55.1	57.0
45-49	43.7	44.8	46.0	47.2	48.4	49.4	50.2	50.7	51.1	51.2	51.2	51.1	51.0	50.8	50.7	50.9
50-54	38.0	38.9	39.8	40.8	41.7	42.7	43.8	45.0	46.1	47.3	48.3	49.1	49.6	49.9	50.1	50.1
55-59	32.3	33.2	34.0	34.8	35.5	36.3	37.2	38.1	39.0	39.9	40.9	42.0	43.1	44.2	45.3	46.3
60-64	26.4	26.9	27.5	28.3	29.2	30.0	30.8	31.5	32.3	33.0	33.8	34.6	35.4	36.3	37.1	38.0
65-69	21.3	21.8	22.3	22.7	23.1	23.4	23.9	24.5	25.2	26.0	26.7	27.4	28.1	28.8	29.4	30.1
70-74	15.2	15.5	16.0	16.5	17.2	17.8	18.2	18.6	19.0	19.3	19.6	20.0	20.5	21.1	21.8	22.4
75-79	10.8	10.9	10.9	11.1	11.2	11.4	11.7	12.0	12.5	13.0	13.4	13.8	14.1	14.4	14.6	14.9
80-84	7.1	7.1	7.1	7.0	6.9	6.9	6.9	7.0	7.1	7.2	7.3	7.5	7.7	8.0	8.4	8.6
85+	4.2	4.4	4.6	4.7	4.9	5.0	5.0	5.1	5.1	5.1	5.2	5.2	5.3	5.4	5.5	5.6
TOTAL	813.2	827.1	842.2	857.7	873.6	890.1	907.1	924.6	942.7	961.2	980.2	999.6	1019.3	1039.3	1059.4	1079.4

TABLE P.4 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: FEMALES
Series C: Low Fertility and Net Migration Gain of 7,500 Persons a Year -- concluded

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.3	16.0	16.5	17.0	17.6	18.2	18.8	19.4	20.0	20.5	21.1	21.6	22.0	22.4	22.6	22.7
1	14.6	15.3	16.0	16.5	17.1	17.6	18.2	18.8	19.4	20.0	20.6	21.1	21.6	22.0	22.3	22.6
2	14.7	14.6	15.3	16.1	16.6	17.1	17.7	18.2	18.8	19.5	20.0	20.6	21.1	21.6	22.1	22.4
3	15.2	14.8	14.7	15.4	16.1	16.7	17.2	17.8	18.3	18.9	19.5	20.1	20.7	21.2	21.7	22.1
4	14.9	15.2	14.9	14.8	15.5	16.2	16.7	17.3	17.8	18.4	19.0	19.6	20.2	20.8	21.3	21.8
0-4	74.7	75.9	77.4	79.8	82.9	85.8	88.6	91.5	94.3	97.3	100.2	103.0	105.6	108.0	110.0	111.6
5	16.6	15.0	15.3	14.9	14.8	15.5	16.3	16.8	17.4	17.9	18.5	19.1	19.6	20.2	20.8	21.4
6	18.1	16.7	15.0	15.4	15.0	14.9	15.6	16.3	16.9	17.4	18.0	18.5	19.1	19.7	20.3	20.9
7	18.7	18.1	16.7	15.1	15.4	15.1	15.0	15.7	16.4	16.9	17.5	18.0	18.6	19.2	19.8	20.4
8	18.5	18.8	18.2	16.8	15.2	15.5	15.1	15.0	15.7	16.5	17.0	17.5	18.1	18.7	19.2	19.8
9	18.4	18.5	18.8	18.2	16.9	15.2	15.5	15.2	15.1	15.8	16.5	17.1	17.6	18.1	18.7	19.3
5-9	90.3	87.0	84.0	80.4	77.3	76.2	77.5	79.0	81.5	84.5	87.5	90.2	93.0	95.9	98.8	101.8
10	18.3	18.5	18.5	18.9	18.3	16.9	15.3	15.6	15.2	15.1	15.8	16.6	17.1	17.6	18.2	18.8
11	18.1	18.4	18.5	18.6	18.9	18.3	16.9	15.3	15.6	15.3	15.2	15.9	16.6	17.1	17.7	18.2
12	17.7	18.1	18.4	18.5	18.6	18.9	18.3	16.9	15.4	15.7	15.3	15.2	15.9	16.7	17.1	17.7
13	17.3	17.7	18.2	18.4	18.6	18.7	19.0	18.4	17.0	15.4	15.7	15.3	15.2	16.0	16.7	17.2
14	16.7	17.3	17.8	18.2	18.4	18.6	18.7	19.0	18.4	17.0	15.4	15.7	15.4	15.3	16.0	16.8
10-14	88.1	90.0	91.4	92.6	92.8	91.4	88.2	85.2	81.6	78.5	77.4	78.7	80.2	82.7	85.7	88.7
15	16.1	16.7	17.3	17.8	18.2	18.5	18.7	18.7	19.0	18.5	17.0	15.5	15.8	15.4	15.3	16.0
16	15.5	16.1	16.8	17.4	17.9	18.3	18.5	18.7	18.8	19.1	18.5	17.1	15.5	15.8	15.5	15.4
17	15.0	15.5	16.2	16.8	17.4	17.9	18.3	18.6	18.2	18.8	19.1	18.5	17.1	15.6	15.9	15.5
18	14.6	15.1	15.6	16.2	16.9	17.4	18.0	18.4	18.6	18.8	18.9	19.2	18.6	17.2	15.6	15.9
19	14.2	14.7	15.1	15.7	16.3	17.0	17.5	18.0	18.5	18.7	18.9	19.0	19.3	18.7	17.3	15.7
15-19	75.4	78.1	81.0	83.9	86.7	89.1	91.0	92.4	93.6	93.9	92.4	89.3	86.3	82.7	79.6	78.5
20	13.9	14.3	14.8	15.3	15.8	16.4	17.1	17.6	18.2	18.5	18.8	19.0	19.1	19.3	18.8	17.4
21	13.5	14.0	14.5	14.9	15.4	15.9	16.5	17.2	17.8	18.3	18.7	18.9	19.1	19.2	19.5	18.9
22	13.1	13.7	14.1	14.6	15.1	15.5	16.1	16.7	17.3	17.9	18.5	18.8	19.1	19.3	19.3	19.7
23	12.7	13.3	13.8	14.3	14.7	15.2	15.7	16.2	16.8	17.5	18.1	18.6	19.0	19.3	19.4	19.5
24	12.3	12.8	13.4	13.9	14.4	14.9	15.3	15.8	16.3	17.0	17.6	18.2	18.7	19.1	19.4	19.5
20-24	65.5	68.1	70.6	73.0	75.4	77.9	80.7	83.5	86.4	89.2	91.7	93.5	95.0	96.2	96.4	95.0
25-29	54.8	57.2	59.9	62.7	65.6	68.3	71.0	73.5	75.9	78.2	80.8	83.6	86.4	89.3	92.1	94.5
30-34	48.8	49.8	51.1	52.6	54.4	56.5	59.0	61.6	64.5	67.3	70.1	72.7	75.2	77.6	80.0	82.5
35-39	47.3	47.5	47.9	48.3	48.9	49.8	50.8	52.1	53.6	55.4	57.5	59.9	62.6	65.4	68.3	71.0
40-44	46.8	47.0	47.2	47.4	47.6	47.8	48.0	48.4	48.8	49.4	50.2	51.3	52.6	54.0	55.8	58.0
45-49	43.7	44.7	45.5	46.0	46.5	46.8	47.1	47.3	47.5	47.6	47.8	48.1	48.4	48.9	49.5	50.3
50-54	37.2	38.3	39.5	40.9	42.1	43.3	44.3	45.1	45.7	46.1	46.4	46.7	46.9	47.1	47.3	47.5
55-59	31.4	32.5	33.6	34.6	35.6	36.6	37.7	38.9	40.2	41.5	42.6	43.6	44.4	45.0	45.4	45.7
60-64	25.1	26.0	27.0	28.2	29.3	30.5	31.6	32.6	33.5	34.5	35.5	36.6	37.8	39.0	40.3	41.4
65-69	19.8	20.5	21.3	22.1	22.9	23.7	24.6	25.6	26.7	27.8	28.9	29.9	30.9	31.8	32.7	33.7
70-74	15.0	15.4	16.0	16.6	17.2	17.9	18.6	19.4	20.1	20.8	21.6	22.4	23.3	24.3	25.3	26.3
75-79	11.2	11.4	11.6	11.9	12.2	12.6	12.9	13.4	13.9	14.5	15.1	15.7	16.3	16.9	17.5	18.2
80-84	7.1	7.4	7.6	7.8	8.0	8.2	8.3	8.5	8.7	9.0	9.2	9.5	9.9	10.3	10.7	11.1
85+	4.6	4.8	5.0	5.2	5.4	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	7.6	7.8
TOTAL	786.8	801.6	817.6	834.0	850.8	868.1	885.8	904.1	922.8	942.0	961.6	981.6	1001.9	1022.4	1043.0	1063.6

TABLE P.5 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: BOTH SEXES
Series D: Low Fertility and Zero Migration a Year

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	31.1	31.8	32.3	32.9	33.5	34.1	34.8	35.5	36.2	36.8	37.5	38.0	38.4	38.6	38.7	38.5
1	30.3	30.9	31.7	32.2	32.8	33.4	34.0	34.7	35.4	36.1	36.7	37.3	37.8	38.3	38.5	38.6
2	30.3	30.1	30.9	31.6	32.2	32.8	33.4	34.0	34.7	35.4	36.1	36.7	37.3	37.8	38.2	38.5
3	31.0	30.3	30.1	30.9	31.6	32.2	32.7	33.4	34.0	34.6	35.3	36.0	36.7	37.3	37.8	38.2
4	31.0	30.9	30.3	30.1	30.9	31.6	32.2	32.7	33.3	34.0	34.6	35.3	36.0	36.6	37.3	37.7
0-4	153.7	154.0	155.3	157.7	161.0	164.1	167.1	170.3	173.6	176.9	180.2	183.3	186.2	188.6	190.5	191.5
5	34.0	31.0	30.9	30.3	30.1	30.8	31.6	32.1	32.7	33.3	34.0	34.6	35.3	36.0	36.6	37.2
6	37.4	34.0	31.0	30.9	30.3	30.1	30.8	31.6	32.1	32.7	33.3	34.0	34.6	35.3	36.0	36.6
7	38.2	37.3	34.0	31.0	30.9	30.3	30.1	30.8	31.6	32.1	32.7	33.3	33.9	34.6	35.3	36.0
8	37.9	38.1	37.3	34.0	31.0	30.8	30.3	30.1	30.8	31.6	32.1	32.7	33.3	33.9	34.6	35.3
9	37.5	37.8	38.1	37.2	33.9	31.0	30.8	30.2	30.1	30.8	31.5	32.1	32.7	33.3	33.9	34.6
5-9	185.0	178.2	171.3	163.4	156.2	153.0	153.6	154.8	157.3	160.5	163.6	166.7	169.8	173.1	176.4	179.7
10	37.4	37.5	37.8	38.1	37.2	34.0	31.0	30.8	30.2	30.0	30.8	31.6	32.1	32.7	33.3	33.9
11	37.0	37.4	37.5	37.8	38.1	37.2	33.9	31.0	30.8	30.2	30.1	30.8	31.5	32.1	32.7	33.3
12	36.2	36.9	37.3	37.5	37.8	38.1	37.2	33.9	31.0	30.8	30.2	30.0	30.8	31.5	32.1	32.6
13	35.4	36.2	36.9	37.3	37.5	37.7	38.1	37.2	33.9	31.0	30.8	30.2	30.0	30.7	31.5	32.1
14	34.3	35.3	36.2	36.8	37.3	37.5	37.7	38.1	37.2	33.9	30.9	30.8	30.2	30.0	30.7	31.5
10-14	180.3	183.3	185.7	187.5	187.9	184.5	177.9	171.0	163.1	155.9	152.8	153.4	154.6	157.0	160.3	163.4
15	33.2	34.3	35.3	36.2	36.8	37.3	37.4	37.7	38.1	37.2	33.9	30.9	30.8	30.2	30.0	30.7
16	32.0	33.1	34.3	35.3	36.2	36.8	37.2	37.4	37.7	38.1	37.2	33.8	30.9	30.8	30.2	30.0
17	30.9	32.0	33.1	34.2	35.2	36.1	36.8	37.2	37.4	37.6	38.0	37.1	33.8	30.9	30.7	30.2
18	29.8	30.8	31.9	33.1	34.2	35.2	36.1	36.7	37.2	37.4	37.6	38.0	37.1	33.8	30.8	30.7
19	28.9	29.8	30.8	31.9	33.1	34.2	35.2	36.1	36.7	37.1	37.3	37.6	38.0	37.0	33.8	30.8
15-19	154.8	160.0	165.4	170.7	175.5	179.6	182.7	185.1	187.0	187.4	184.0	177.4	170.6	162.7	155.5	152.4
20	28.0	28.8	29.8	30.8	31.9	33.0	34.1	35.1	36.0	36.7	37.1	37.3	37.5	37.9	37.0	33.7
21	27.1	27.9	28.8	29.7	30.7	31.8	33.0	34.1	35.1	36.0	36.6	37.0	37.2	37.5	37.9	37.0
22	26.1	27.0	27.9	28.8	29.7	30.7	31.8	32.9	34.1	35.0	36.0	36.6	37.0	37.2	37.5	37.9
23	25.2	26.1	27.0	27.8	28.7	29.7	30.7	31.8	32.9	34.0	35.0	35.9	36.6	37.0	37.2	37.4
24	24.2	25.2	26.0	26.9	27.8	28.7	29.6	30.6	31.7	32.9	34.0	35.0	35.9	36.5	36.9	37.1
20-24	130.6	135.0	139.5	144.0	148.8	153.9	159.2	164.5	169.8	174.6	178.7	181.8	184.2	186.1	186.5	183.1
25-29	108.1	111.6	115.8	120.3	125.0	129.7	134.2	138.7	143.2	148.0	153.0	158.3	163.7	168.9	173.7	177.8
30-34	98.4	99.2	100.4	102.1	104.5	107.4	111.0	115.1	119.7	124.4	129.0	133.5	137.9	142.5	147.2	152.2
35-39	98.5	98.1	97.8	97.5	97.4	97.7	98.5	99.8	101.5	103.8	106.8	110.3	114.4	118.9	123.6	128.2
40-44	96.5	97.2	97.6	97.8	97.7	97.5	97.2	96.9	96.6	96.5	96.8	97.6	98.9	100.6	102.9	105.9
45-49	87.4	89.3	91.0	92.6	93.9	95.0	95.8	96.2	96.3	96.3	96.1	95.8	95.5	95.2	95.1	95.5
50-54	75.2	77.1	79.1	81.2	83.3	85.3	87.2	88.9	90.4	91.7	92.8	93.6	94.0	94.2	94.1	93.9
55-59	63.7	65.5	67.3	69.0	70.6	72.3	74.2	76.1	78.2	80.2	82.2	84.0	85.7	87.2	88.5	89.5
60-64	51.5	52.8	54.4	56.2	58.1	59.9	61.7	63.4	65.0	66.5	68.2	70.0	71.8	73.8	75.8	77.6
65-69	41.1	42.3	43.5	44.6	45.6	46.8	48.0	49.5	51.2	53.0	54.7	56.3	57.9	59.4	60.8	62.4
70-74	30.2	30.9	31.8	32.9	34.1	35.4	36.5	37.6	38.5	39.5	40.5	41.7	43.0	44.5	46.1	47.6
75-79	22.0	22.3	22.5	22.9	23.3	23.8	24.4	25.2	26.1	27.1	28.1	29.0	29.9	30.7	31.5	32.4
80-84	14.2	14.5	14.7	14.8	14.9	15.0	15.2	15.4	15.6	16.0	16.3	16.8	17.4	18.0	18.7	19.4
85+	8.8	9.1	9.5	9.9	10.3	10.6	10.9	11.2	11.4	11.6	11.8	12.1	12.3	12.6	12.9	13.2
TOTAL	1600.0	1620.4	1642.6	1665.1	1688.1	1711.5	1735.3	1759.7	1784.5	1809.9	1835.6	1861.6	1887.8	1914.0	1940.1	1965.7

TABLE P.5 -- Projections of the Population of Alberta by Age and Sex, 1970 to 1985: MALES
Series D: Low Fertility and Zero Migration a Year -- continued

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.8	16.3	16.5	16.8	17.1	17.5	17.8	18.2	18.5	18.9	19.2	19.4	19.6	19.8	19.8	19.7
1	15.7	15.7	16.2	16.5	16.8	17.1	17.4	17.8	18.1	18.5	18.8	19.1	19.4	19.6	19.7	19.7
2	15.6	15.6	15.7	16.2	16.5	16.8	17.1	17.4	17.7	18.1	18.4	18.8	19.1	19.3	19.6	19.7
3	15.8	15.6	15.6	15.7	16.2	16.4	16.8	17.1	17.4	17.7	18.1	18.5	18.8	19.1	19.3	19.6
4	16.1	15.8	15.6	15.6	15.7	16.2	16.4	16.7	17.1	17.4	17.7	18.1	18.4	18.8	19.1	19.3
0-4	79.0	79.0	79.6	80.8	82.3	84.0	85.5	87.2	88.8	90.6	92.2	93.9	95.3	96.6	97.5	98.0
5	17.4	16.1	15.7	15.6	15.6	15.7	16.2	16.4	16.7	17.1	17.4	17.7	18.1	18.4	18.8	19.1
6	19.3	17.4	16.1	15.7	15.6	15.5	15.7	16.2	16.4	16.7	17.1	17.4	17.7	18.1	18.4	18.7
7	19.5	19.2	17.4	16.1	15.7	15.6	15.5	15.7	16.1	16.4	16.7	17.1	17.4	17.7	18.1	18.4
8	19.4	19.5	19.2	17.4	16.1	15.7	15.6	15.5	15.7	16.1	16.4	16.7	17.0	17.4	17.7	18.0
9	19.1	19.3	19.5	19.2	17.4	16.1	15.7	15.6	15.6	15.7	16.1	16.4	16.7	17.0	17.3	17.7
5-9	94.7	91.5	87.9	84.0	80.4	78.6	78.7	79.4	80.5	82.0	83.7	85.3	86.9	88.6	90.3	91.9
10	19.1	19.1	19.4	19.5	19.2	17.4	16.1	15.7	15.6	15.5	15.6	16.1	16.4	16.7	17.0	17.4
11	18.9	19.0	19.1	19.3	19.5	19.2	17.4	16.1	15.7	15.6	15.5	15.7	16.1	16.4	16.7	17.0
12	18.5	18.8	19.0	19.1	19.3	19.4	19.2	17.4	16.1	15.7	15.6	15.5	15.7	16.1	16.4	16.7
13	18.1	18.5	18.8	19.0	19.1	19.3	19.4	19.2	17.3	16.1	15.7	15.6	15.5	15.7	16.1	16.4
14	17.6	18.1	18.5	18.8	19.0	19.1	19.3	19.4	19.2	17.3	16.1	15.7	15.6	15.5	15.7	16.1
10-14	92.2	93.5	94.8	95.7	96.1	94.4	91.4	87.8	83.9	80.2	78.5	78.6	79.3	80.4	81.9	83.6
15	17.1	17.6	18.1	18.5	18.8	19.0	19.1	19.3	19.4	19.2	17.3	16.0	15.7	15.5	15.5	15.6
16	16.5	17.1	17.6	18.1	18.5	18.8	19.0	19.1	19.3	19.4	19.1	17.3	16.0	15.7	15.5	15.5
17	15.9	16.5	17.0	17.6	18.0	18.4	18.7	18.9	19.0	19.2	19.4	19.1	17.3	16.0	15.7	15.5
18	15.2	15.8	16.5	17.0	17.5	18.0	18.4	18.7	18.9	19.0	19.2	19.4	19.1	17.3	16.0	15.6
19	14.7	15.2	15.8	16.4	17.0	17.5	18.0	18.4	18.7	18.9	19.0	19.2	19.4	19.1	17.2	16.0
15-19	79.4	82.2	85.0	87.6	89.8	91.7	93.2	94.4	95.3	95.7	94.0	91.0	87.5	83.6	79.9	78.2
20	14.1	14.6	15.2	15.8	16.4	17.0	17.5	17.9	18.4	18.7	18.9	19.0	19.2	19.3	19.0	17.2
21	13.6	14.1	14.6	15.2	15.8	16.4	16.9	17.5	17.9	18.3	18.6	18.8	18.9	19.1	19.3	19.0
22	13.0	13.5	14.0	14.6	15.1	15.7	16.4	16.9	17.4	17.9	18.3	18.6	18.8	18.9	19.1	19.3
23	12.5	13.0	13.5	14.0	14.5	15.1	15.7	16.3	16.9	17.4	17.8	18.3	18.6	18.8	18.9	19.1
24	11.9	12.4	13.0	13.4	14.0	14.5	15.1	15.7	16.3	16.8	17.4	17.8	18.2	18.5	18.7	18.8
20-24	65.1	67.6	70.3	73.0	75.8	78.7	81.6	84.3	86.9	89.1	91.0	92.5	93.7	94.6	95.0	93.4
25-29	53.3	55.0	57.0	59.3	61.8	64.4	67.0	69.6	72.4	75.2	78.1	80.9	83.6	86.2	88.4	90.3
30-34	49.6	49.6	50.0	50.6	51.6	52.9	54.6	56.5	58.9	61.4	63.9	66.5	69.1	71.9	74.6	77.5
35-39	51.2	50.8	50.3	49.8	49.4	49.1	49.2	49.6	50.2	51.1	42.4	54.1	56.1	58.4	60.9	63.4
40-44	49.7	50.3	50.7	50.8	50.7	50.5	50.2	49.7	49.2	48.8	48.6	48.7	49.0	49.6	50.6	51.9
45-49	43.7	44.7	45.8	46.8	47.9	48.8	49.4	49.7	49.9	49.8	49.6	49.2	48.8	48.3	47.9	47.7
50-54	38.0	38.8	39.7	40.6	41.4	42.3	43.3	44.4	45.4	46.4	47.3	47.9	48.3	48.4	48.3	48.1
55-59	32.3	33.1	33.9	34.6	35.3	36.1	36.9	37.7	38.6	39.4	40.3	41.2	42.2	43.2	44.2	45.1
60-64	26.4	26.9	27.4	28.2	29.0	29.8	30.5	31.3	31.9	32.6	33.3	34.1	34.8	35.6	36.4	37.3
65-69	21.3	21.8	22.3	22.6	22.9	23.3	23.7	24.3	24.9	25.7	26.4	27.0	27.7	28.3	28.9	29.6
70-74	15.2	15.5	15.9	16.5	17.1	17.6	18.1	18.5	18.8	19.1	19.4	19.7	20.2	20.8	21.4	22.0
75-79	10.8	10.9	10.9	11.0	11.2	11.4	11.6	11.9	12.4	12.9	13.3	13.6	13.9	14.2	14.4	14.6
80-84	7.1	7.1	7.1	7.0	6.9	6.9	6.9	6.9	7.0	7.1	7.2	7.4	7.7	7.9	8.2	8.5
85+	4.2	4.4	4.5	4.7	4.8	5.0	5.0	5.1	5.1	5.1	5.2	5.2	5.3	5.3	5.4	5.5
TOTAL	813.2	822.7	833.1	843.6	854.4	865.5	876.8	888.3	900.1	912.2	924.4	936.8	949.4	961.9	974.4	986.6

Series D: Low Fertility and Zero Migration a Year -- concluded

(numbers in thousands as of June 1)

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	15.3	15.5	15.8	16.1	16.4	16.7	17.0	17.3	17.6	18.0	18.3	18.5	18.7	18.9	18.9	18.8
1	14.6	15.2	15.5	15.7	16.0	16.3	16.6	16.9	17.3	17.6	17.9	18.2	18.5	18.7	18.8	18.8
2	14.7	14.6	15.2	15.4	15.7	16.0	16.3	16.6	16.9	17.2	17.6	17.9	18.2	18.4	18.6	18.8
3	15.2	14.7	14.5	15.2	15.4	15.7	16.0	16.3	16.6	16.9	17.2	17.6	17.9	18.2	18.4	18.6
4	14.9	15.1	14.7	14.5	15.2	15.4	15.7	16.0	16.3	16.6	16.9	17.3	17.6	17.9	18.2	18.4
0-4	74.7	75.1	75.7	76.9	78.7	80.1	81.6	83.1	84.7	86.3	87.9	89.5	90.9	92.1	92.9	93.4
5	16.6	14.9	15.1	14.7	14.5	15.2	15.4	15.7	16.0	16.3	16.6	16.8	17.2	17.6	17.9	18.2
6	18.1	16.6	14.9	15.1	14.7	14.5	15.2	15.4	15.7	16.0	16.3	16.6	16.9	17.2	17.6	17.9
7	18.7	18.1	16.6	14.9	15.1	14.7	14.5	15.2	15.4	15.7	15.9	16.3	16.6	16.9	17.2	17.5
8	18.5	18.7	18.1	16.6	14.9	15.1	14.7	14.5	15.2	15.4	15.7	16.0	16.3	16.6	16.9	17.2
9	18.4	18.4	18.7	18.1	16.6	14.9	15.1	14.7	14.5	15.1	15.4	15.7	15.9	16.2	16.5	16.9
5-9	90.3	86.7	83.4	79.4	75.8	74.4	74.9	75.5	76.8	78.5	79.9	81.4	82.9	84.5	86.1	87.7
10	18.3	18.4	18.4	18.7	18.0	16.6	14.9	15.1	14.7	14.5	15.1	15.4	15.7	15.9	16.3	16.6
11	18.1	18.3	18.4	18.4	18.7	18.0	16.6	14.9	15.1	14.7	14.5	15.1	15.4	15.7	15.9	16.2
12	17.7	18.1	18.3	18.4	18.4	18.7	18.0	16.5	14.9	15.1	14.7	14.5	15.1	15.4	15.7	15.9
13	17.3	17.7	18.1	18.3	18.4	18.4	18.7	18.0	16.6	14.9	15.1	14.7	14.5	15.1	15.4	15.7
14	16.7	17.2	17.7	18.1	18.3	18.4	18.4	18.7	18.0	16.5	14.9	15.1	14.7	14.5	15.1	15.4
10-14	88.1	89.7	90.9	91.9	91.8	90.1	86.6	83.2	79.3	75.7	74.3	74.8	75.4	76.6	78.4	79.8
15	16.1	16.7	17.2	17.7	18.1	18.3	18.3	18.4	18.6	18.0	16.5	14.9	15.1	14.6	14.5	15.1
16	15.5	16.0	16.7	17.2	17.7	18.0	18.3	18.4	18.4	18.6	18.0	16.5	14.9	15.1	14.7	14.5
17	15.0	15.5	16.0	16.7	17.2	17.7	18.0	18.3	18.4	18.4	18.6	18.0	16.5	14.9	15.1	14.7
18	14.6	15.0	15.5	16.0	16.7	17.2	17.7	18.0	18.3	18.4	18.4	18.6	18.0	16.5	14.8	15.1
19	14.2	14.6	15.0	15.5	16.0	16.7	17.2	17.7	18.0	18.3	18.4	18.4	18.6	18.0	16.5	14.8
15-19	75.4	77.8	80.4	83.1	85.7	87.9	89.5	90.8	91.7	91.7	89.9	86.4	83.1	79.1	75.6	74.2
20	13.9	14.2	14.6	15.0	15.4	16.0	16.7	17.2	17.7	18.0	18.3	18.3	18.4	18.6	18.0	16.5
21	13.5	13.8	14.2	14.5	15.0	15.4	16.0	16.7	17.2	17.7	18.0	18.2	18.3	18.4	18.6	18.0
22	13.1	13.5	13.8	14.2	14.6	15.0	15.4	16.0	16.6	17.2	17.6	18.0	18.2	18.3	18.3	18.6
23	12.7	13.1	13.5	13.8	14.2	14.6	15.0	15.4	16.0	16.6	17.2	17.6	18.0	18.2	18.3	18.3
24	12.3	12.7	13.1	13.5	13.8	14.2	14.5	14.9	15.4	16.0	16.6	17.2	17.6	18.0	18.2	18.3
20-24	65.5	67.3	69.2	71.0	73.0	75.2	77.6	80.2	82.9	85.5	87.7	89.3	90.5	91.5	91.4	89.7
25-29	54.8	56.7	58.8	61.0	63.2	65.3	67.2	69.0	70.9	72.8	75.0	77.4	80.0	82.7	85.3	87.5
30-34	48.8	49.5	50.4	51.5	52.9	54.6	56.5	58.6	60.8	63.0	65.1	67.0	68.8	70.6	72.6	74.8
35-39	47.3	47.3	47.4	47.7	48.0	48.5	49.3	50.2	51.3	52.7	54.3	56.2	58.3	60.6	62.7	64.8
40-44	45.8	46.9	47.0	47.0	47.0	47.0	47.0	47.1	47.3	47.7	48.2	49.0	49.9	51.0	52.4	54.0
45-49	43.7	44.6	45.3	45.7	46.0	46.2	46.4	46.5	46.5	46.5	46.5	46.5	46.7	46.9	47.2	47.8
50-54	37.2	38.3	39.4	40.6	41.8	42.9	43.8	44.5	45.0	45.3	45.5	45.6	45.7	45.8	45.8	45.8
55-59	31.4	32.4	33.4	34.4	35.3	36.2	37.3	38.4	39.6	40.8	41.9	42.8	43.5	43.9	44.3	44.5
60-64	25.1	25.9	26.9	28.0	29.1	30.2	31.2	32.1	33.0	33.9	34.9	35.9	37.0	38.1	39.3	40.4
65-69	19.8	20.5	21.2	21.9	22.7	23.5	24.3	25.3	26.3	27.3	28.3	29.3	30.2	31.1	31.9	32.8
70-74	15.0	15.4	15.9	16.5	17.1	17.7	18.4	19.1	19.7	20.4	21.2	21.9	22.8	23.7	24.7	25.6
75-79	11.2	11.4	11.6	11.8	12.1	12.4	12.8	13.3	13.7	14.2	14.8	15.4	15.9	16.5	17.1	17.7
80-84	7.1	7.4	7.6	7.8	8.0	8.1	8.3	8.4	8.6	8.9	9.1	9.4	9.7	10.1	10.5	10.9
85+	4.6	4.8	5.0	5.2	5.4	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	7.5	7.7
TOTAL	786.8	797.7	809.5	821.4	833.6	846.0	858.6	871.4	884.4	897.7	911.2	924.7	938.4	952.1	965.7	979.1

APPENDIX TABLE D.1 -- Abridged Life Table by Sex for Alberta, 1960-62

Age (x)	1,000 q(x)	d(x)	1,000 m(x)	l(x)	L(x)	T(x)	e^{o}(x)
Males							
0	30.64	3,064	30.72	100,000	97,629	6,947,751	69.48
1	4.43	430	1.11	96,936	386,923	6,850,482	70.67
5	2.02	195	.40	96,506	482,078	6,463,558	66.98
10	2.61	252	.52	96,311	479,319	5,981,479	62.11
15	6.15	590	1.23	96,060	478,904	5,502,160	57.28
20	9.30	888	1.87	95,469	475,253	5,023,256	52.62
25	7.72	730	1.55	94,581	471,183	4,548,003	48.09
30	8.35	784	1.68	93,851	467,409	4,076,819	43.44
35	10.64	990	2.14	93,068	463,004	3,609,409	38.78
40	15.27	1,406	3.08	92,078	457,071	3,146,404	34.17
45	24.61	2,232	4.98	90,672	448,082	2,689,332	29.66
50	39.89	3,527	8.13	88,440	433,838	2,241,249	25.34
55	61.59	5,230	12.69	84,912	412,114	1,807,411	21.29
60	98.08	7,815	20.58	79,682	379,683	1,395,296	17.51
65	146.92	10,559	31.63	71,867	333,789	1,015,614	14.13
70	220.17	13,498	49.37	61,309	273,385	681,824	11.12
75	320.94	15,344	76.53	47,811	200,492	408,439	8.54
80	459.12	14,906	120.70	32,466	123,500	207,947	6.41
85	595.57	10,458	176.22	17,560	59,347	84,447	4.31
90+	1,000.00	7,102	282.77	7,102	25,100	25,100	3.53
Females							
0	22.77	2,277	22.92	100,000	98,052	7,547,333	75.47
1	3.47	339	.87	97,723	390,251	7,449,281	76.23
5	1.87	182	.37	97,385	486,481	7,059,030	72.49
10	1.57	152	.31	97,202	485,640	6,572,549	67.62
15	3.38	328	.68	97,050	484,475	6,086,909	62.72
20	3.12	302	.63	96,722	482,896	5,602,433	57.92
25	3.04	293	.61	96,419	481,399	5,119,536	53.10
30	3.79	364	.76	96,126	479,770	4,638,136	48.25
35	5.93	568	1.19	95,762	477,460	4,158,366	43.42
40	9.54	908	1.92	95,194	473,817	3,680,906	38.67
45	14.34	1,352	2.89	94,286	468,217	3,207,089	34.01
50	21.31	1,981	4.31	92,934	459,955	2,738,871	29.47
55	36.05	3,279	7.34	90,953	446,943	2,278,916	25.06
60	52.49	4,602	10.77	87,674	427,359	1,831,973	20.90
65	86.25	7.165	18.00	83,072	398,109	1,404,613	16.91
70	140.93	10,698	30.26	75,907	353,505	1,006,504	13.26
75	240.74	15,698	54.69	65,210	287,050	652,999	10.01
80	372.54	18,445	92.09	49,512	200,298	365,950	7.39
85	549.01	17,056	155.96	31,067	109,363	165,652	5.33
90+	1,000.00	14,011	248.84	14,011	56,289	56,289	4.02

SOURCE: Based on the age specific death rates for the period 1960-62. See DBS, *Vital Statistics (annual), 1960 to 1962*. Catalogue No. 84-202.

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